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Red Hill Creek Expressway

North - South Section

Proposed Assessment Process

SPECIAL PROJECTS OFFICE

Roads Department

Transportation/Environmental Services Group

Region of Hamilton-Wentworth

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February 1996

TABLE OF CONTENTS

	PAGE NO.
1. INTRODUCTION	
Background	1
Purpose of This Document	2
Project History	2
Review and Comment	4
Documented Concerns (1990-1995)	5
Questions & Comments	6
2. STAKEHOLDER CONSULTATION PROGRAM	
Purpose	7
Goal	7
Stakeholder Input	7
Consultation Activities	7
Assessment Process Schedule	9
Dispute Resolution	9
Questions & Comments	9
3. APPROVALS/PERMITS AND IMPACT ASSESSMENT	
Hearing Board Approval and Conditions	10
• The Approval Expressway	10
• Conditions of Approval	10
Applicable Legislation, Policies, and Guidelines	13
Impact Assessment Process	16

Description of the Existing Environment	16
• Collection of Data on a Watershed Basis	17
• What is a Watershed Plan?	17
• How Would Environmental Interests and the Expressway be Accommodated in a Watershed Planning Approach?	18
• How Should the Watershed Planning Approach Be Developed?	19
• Watershed Data Assessment and Collection	19
• Assessment of Data for Site Specific Areas	20
Prediction of Net Environmental Impacts	21
• Mitigation and Compensation	22
Evaluate Proposed Changes	24
• Evaluation Categories, Factors, and Indicators	24
• Methodology for Evaluation	24
• Documentation	25
Detailed Design and Construction Monitoring	26
• Documentation	26
• Construction	26
1. Contract Preparation	26
2. Construction Management	28
3. Construction Staging	29
• Post Construction Monitoring	30
Questions & Comments	31
 4. EXPRESSWAY DESIGN CHANGES AND ENVIRONMENTAL ASSESSMENT ACT APPROVAL	
Background	32
Board Decision	33
Proposed Changes	33
• Queen Elizabeth Way (QEW) Interchange	35
• Niagara Escarpment Crossing	36
• Community Access	38
Need to Amend an Approved EA	41

Table of Contents (Continue)**PAGE NO.**

Ways to Amend an Approved EA	41
The Selected Approach	43
Why This Approach?	43
Exemption Order Approval Process	44
Draft Exemption Order Submission	45
Questions & Comments	45

AFTER PAGE NO.**FIGURES**


1.	The Approved Red Hill Creek Expressway Highway 403 to the Q.E.W.	1
2.	Assessment Process Schedule	9
3.	The Approved Expressway North-South Alignment	10
4.	Red Hill Creek Watershed	17
5.	Red Hill Creek North-South Expressway Watershed Process	19
6.	Proposed Changes to the Approved North-South Expressway	33

TABLE

1.	Documented Concerns (1990 - 1995)	6
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APPENDIX

A	Comment Sheet
B	Conditions of Approval
C	Background Studies
D	Consultant Terms of Reference



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Introduction

1. INTRODUCTION

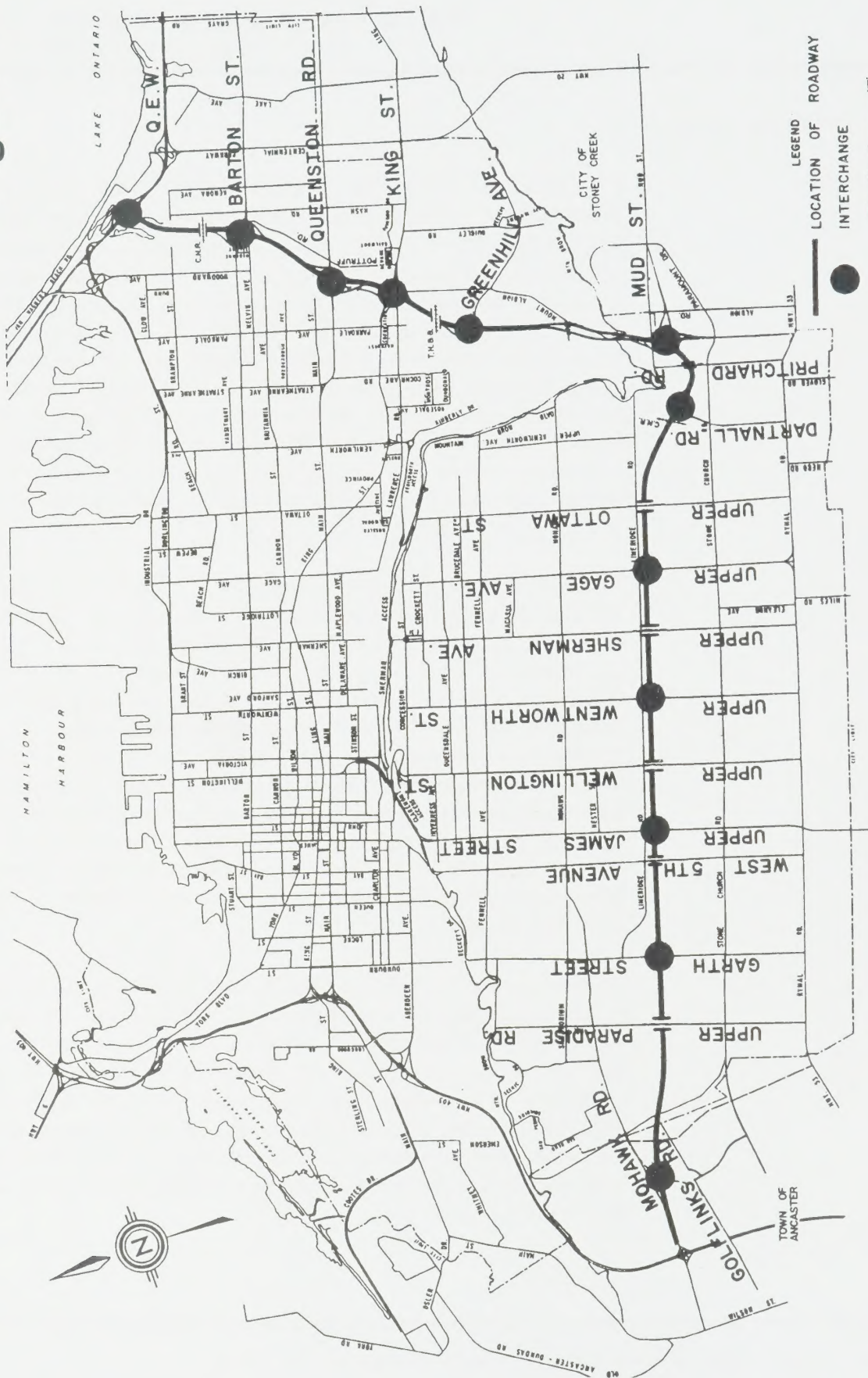
Background

In December, 1982, the Regional Municipality of Hamilton-Wentworth (the Region) submitted an Individual Environmental Assessment (EA) under the Environmental Assessment Act documenting the results of a comprehensive investigation to identify the need, scope and timing for the expansion of the Regional roadway network. The solution described in the EA involves the construction of an Expressway that "connects Highway 403 in Ancaster to the Queen Elizabeth Way in the eastern portion of the City of Hamilton" (see Figure 1). Approval of the roadway was granted by a Joint Hearing Board (i.e., Ontario Municipal Board and Environmental Assessment Board) in 1985, and later endorsed by Cabinet in 1987. Specific details of the approval and related conditions are discussed in Section 4 of this report.

The Expressway is made up of two sections: the East-West "Mountain" section and North-South "Valley" section. Construction of the Mountain section has proceeded since 1990 and is expected to be completed from Highway 403 to Dartnall Road by 1998. Construction in the Valley section, which is the focus of this document, started in 1990 but because of the withdrawal of Provincial funding later that year, only partial work in the vicinity of the King Street and Queenston Road was completed. Since that time, public debate and government review of the original North-South project has led the Region to consider a number of roadway design changes. The changes proposed at this time are expected to reduce impacts to environmental features/systems existing in and adjacent to the Red Hill Creek Valley.

On November 29, 1995, the Minister of Finance announced that the province will provide the Region \$100 million over the next five years (1996 - 2000) towards completion of the Expressway from Highway 403 to, and including, the Queen Elizabeth Way (QEW) interchange. In addition, the Province will pay the \$6.75 million deferred from the 1995 subsidy on the East-West section in 1996. The result of this announcement now enables the Region to proceed with final design and construction of the Expressway connection to the QEW.

Figure 1



The Approved Red Hill Creek Expressway Highway #403 to Q.E.W.

Red Hill Creek Expressway North-South Section: Proposed Assessment Process

This document proposes an assessment process, which the Region is circulating for review and comment, that explains how remaining government approvals and final design changes to the original North-South alignment will be undertaken.

Purpose Of This Document

The purpose of this document is to:

- provide government, interest groups, and the general public an opportunity to review and comment on the Proposed Assessment Process before the Region commences with the study;
- describe the three components of the Region's Proposed Assessment Process:
 - i) Stakeholder Consultation - Section 2 of this report identifies how stakeholders can become involved after the Assessment Process starts;
 - ii) Approvals/Permits and Impact Assessment - the Region proposes a watershed plan approach to determine Expressway impacts, develop appropriate mitigation/compensation measures, and satisfy permit/approval requirements legislated by the provincial and federal government. Specific details are described in Section 3 of this report; and
 - iii) Expressway Design Changes and Environmental Assessment Act Approval - proposed changes to the Expressway design approved in 1985, and the approach the Region will take to satisfy Environmental Assessment Act requirements are described in Section 4 of this report.

Project History

The series of events that have taken place since the EA began in the early 1980's are summarized below:

1982 (November) Region initiates an environmental assessment.

Red Hill Creek Expressway North-South Section: Proposed Assessment Process

1984 (June)	Pre-hearings of a joint three-member panel of the Environmental Assessment Board and the Ontario Municipal Board begin.
1985 (October)	Joint Hearing Board approves Environmental Assessment.
1985 (November)	Decision appealed to Cabinet.
1987 (March)	Cabinet denies appeal and approves project.
1990 (February)	Judicial review disallows an appeal of the 1985 Joint Hearing Board decision.
1990 (April)	Region issues an Executive Summary of the Expressway's preliminary design.
1990 (May)	Construction starts for King Street Interchange (Phase 1), Queenston Road Interchange (Phase 1), and the TH&B rail overpass.
1990 (September)	Construction starts for the Mohawk/Golf Links interchange.
1990 (December)	Ministry of Transportation (MTO) withdraws funding for north-south section.
1991 (February)	Design starts for east-west section between Mohawk/Golf Links interchange and Dartnall Road.
1991 (November)	Three construction contracts in the Valley finished.
1993 (May)	Province agrees to contribute 50% provincial subsidy to the widening and reconstruction of Mud Street between Paramount Drive and Highway 20 as part of the Red Hill Creek Expressway project.

**Red Hill Creek Expressway North-South Section:
Proposed Assessment Process**

1994 (March)	Province presents "Crombie proposal". Region investigates Crombie proposal as well as other north-south alternatives. Region proposed alignment 'C2' a refined version of its 1985 roadway alignment which included some suggestions from the Crombie proposal.
1994 (June)	Public Information Centres held to inform public of the Crombie proposal and Region's 'C2' proposal.
1994 (July)	Regional Council approves 'C2'. generated in March 1994 by Regional staff.
1995 (June)	Regional Council asks the Province to reinstate funding and expedite any environmental assessment approvals. MTO confirms Province's commitment to the project, but with a 50% deferral of the 1995 Provincial subsidy to 1996 (\$6.75 Million).
1995 (September)	City Council approves the development of multi-use trails in the Red Hill Valley on the basis that they do not preclude the Expressway.
1995 (November)	Province agrees to fund Region \$100 million over 5 year span plus payment of the 1995 deferred part of the Expressway subsidy.

Review and Comment

The public, interest groups, and government agencies (i.e., stakeholders) have been asked to review and comment on the Proposed Assessment Process within a 30 day period starting February 21, 1996 and ending March 22, 1996.

Notification of the Proposed Assessment Process review will be forwarded two weeks prior to the 30 day review period to federal/provincial agencies, area municipalities, politicians, interest groups, and adjacent property owners/residents that have requested involvement in this project. Others will be notified a week later

Red Hill Creek Expressway North-South Section: Proposed Assessment Process

through: newspaper advertisements in the Brabant newspapers and Spectator, press releases to local radio stations, Cable 14 notice board, Regional Special Projects Office Computer Bulletin Board (905 546-4083), newsletters in local libraries and municipal Clerk's offices and mailout to those on a mailing list.

Government agencies and interest groups will be provided copies of the Proposed Assessment Process document no later than February 21, 1996. Other members of the public will be able to access the document through the Region's Computer Bulletin Board (905 546-4083) or by visiting any local library, municipal Clerk's Offices, or the Region's Special Projects Office. Any individual that wishes to acquire a copy of the document may do so at a cost of \$15 (contact Special Projects Office). Newsletters summarizing the proposal will also be available at the same location.

Approximately two weeks after the review period begins, the Region will hold a series of meetings with government agencies, interest groups, and the general public to clarify Proposed Assessment Process statements and answer other related questions. Individuals that are unable to attend the scheduled events or require assistance before or after the meetings, should call the Special Projects Office (905 546-4277). All comments received during the 30 day review period will be taken into consideration before the Region finalizes its planning process.

Public meetings will be held March 6th, 7th, and 9th at three separate locations (i.e., at north, south and central locations along the Valley). The format of the March 6th and 7th meetings will consist of a drop-in centre followed by a public presentation and question/answer style session. The March 9th meeting will consist of a drop-in centre only. The drop-in centre will provide individuals not comfortable with public speaking an opportunity to ask staff questions directly.

Documented Concerns (1990-1995)

The public has expressed a number of concerns about the Expressway North-South section since funding was withdrawn in 1990. Table 1 lists the concerns raised between March 1990 and December 1995, and how the Region's Proposed Assessment Process addresses each concern.

DOCUMENTED CONCERNS (1990 - 1995)

TABLE 1

CONCERNS/ ISSUES	DESCRIPTION	REGIONAL RESPONSE
NEED & JUSTIFICATION	<p>Public Comments</p> <ul style="list-style-type: none"> forecasts of economic growth have not occurred as predicted, therefore, the need for a N-S link to the Red Hill Creek Expressway (RHCE) is not required recent cutbacks in Provincial funding will place a greater financial burden on the taxpayers of this Region, which we cannot afford 	<p>The traffic volumes in the east end of the City of Hamilton are currently projected to increase to the point where additional capacity will be required. In recent studies carried out by the Province, there was recognition of this need and for the location for additional capacity to be in a road in the Red Hill Valley.</p> <p>The Region is currently developing a financial strategy to ensure that we can afford this road in the long term.</p> <p>The Region is currently planning to build a four lane road with the ability to expand to six lanes in the future when traffic volumes warrant.</p>
	<p>Additional Comments by Agencies</p> <ul style="list-style-type: none"> opposed to undertaking works for six lanes when it has been shown that only four lanes are needed in foreseeable future 	
ASSESSMENT APPROACH	<p>Public Comments</p> <ul style="list-style-type: none"> changes to the RHCE should be subject to a full Environmental Assessment impacts to Hamilton Harbour should be based on an eco-system approach that considers natural, social and economic conditions full public examination of large projects, such as the RHCE is critical poor long-term environmental planning with respect to the Red Hill Creek (RHC) Valley must be halted and reversed 	<p>The Region is proposing to carry out an impact assessment on all the areas proposed for changes as well as along the main line in order to develop mitigation strategies. A watershed planning approach is being used to inventory significant features and to set objectives and targets.</p> <p>The proposed assessment process request is undergoing full public review prior to submission. The submission also outlines a public consultation process to follow if an Exemption is granted.</p> <p>The initial stage of the project will include a data inventory and analysis of data that has been made available since 1985. This will include a review of the studies prepared by the Red Hill Creek Valley Restoration Project.</p>
	<p>Additional Comments by Agencies</p> <ul style="list-style-type: none"> use current data and information that was not available in 1985 	

CONCERNS/ ISSUES	DESCRIPTION	REGIONAL RESPONSE
LEGISLATIVE/ POLICY REQUIREMENTS	<p>Public Comments</p> <ul style="list-style-type: none"> goals of the Hamilton Harbour Remedial Action Plan (HHRAP) should be recognized in all projects impinging on the Harbour projects must comply with HHRAP development application guidelines which are based on a Fish Habitat Management plan no net loss of fish habitat <p>Additional Comments by Agencies</p> <ul style="list-style-type: none"> harmonization of federal/provincial approval processes (Fisheries Act, Canadian Environmental Assessment Act) meet previous conditions of approval for Lakes and Rivers Improvement Act permit Red Hill Creek is considered a stressed stream and classified as a Policy 2 stream i.e. no further water quality degradation and all reasonable and practical measures must be taken to upgrade water quality demonstrate the ability of the Region to meet Ministry of Environment & Energy (MOEE) noise guideline at all sensitive locations review terms of reference for a noise monitoring program as required under the conditions of approval develop a tree preservation plan to assess the impact of design options prepare a concept plan for ecological restoration of disturbed areas (terrestrial and creek system) ensure contractors are made aware of all environmental considerations and meet all environmental standards and commitments for both construction and operational works 	<p>Regardless of the Exemption Order for proposed changes to the Expressway, the Region is required to comply with all provincial and federal environmental legislation. In order to facilitate a process that will identify and address these requirements, the Region is proposing to set up a Government Review Committee that will work with the Region in integrating legislative requirements in to the project. In addition, a Public Liaison Committee will be established to provide input from interest groups and stakeholders.</p> <p>The proposed process outlines legislation, policies and guidelines that will be referenced during the study as well as mitigation.</p>
NOISE & AIR QUALITY IMPACTS	<p>Public Comments</p> <ul style="list-style-type: none"> remainder of natural greenbelt in the Red Hill Creek ravine will be drastically altered by the introduction of noise and air pollution people living and working adjacent to the Red Hill Creek will be negatively impacted by noise and air pollution visual intrusion <p>Additional Comments by Agencies</p> <ul style="list-style-type: none"> site specific noise mitigation measures should be developed at design and construction stages or as necessary air dispersion at intersections, emission rates and idling emission rates should be considered 	<p>The Expressway will result in additional noise and air quality changes. The Region has carried out noise and air quality assessments and is required to monitor noise and air quality as per the Conditions of Approval of the Expressway. In this phase of the project the Region will review the assessments to ensure that they reflect current standards. The Region utilizes the Ministry of Transportation of Ontario protocol for assessment and mitigation of noise.</p>

CONCERNS/ ISSUES	DESCRIPTION	REGIONAL RESPONSE
<p>WATER QUALITY & QUANTITY IMPACTS</p>	<p><u>Public Comments</u></p> <ul style="list-style-type: none"> • both peak and total flows in the creek have increased substantially as a result of urbanization in the upper watershed - this will be further aggravated by increased development on the south Mountain and in upper Stoney Creek facilitated by the proposed expressway • construction poses a serious threat of increased erosion and sedimentation with deleterious effects on Hamilton Harbour • the intensity of the flows and their fluctuations are also a concern at the mouth of the creek in Windermere basin which acts as a settling pond for effluent from the Woodward Avenue Sanitary Treatment Plant - disturbance, and even scouring of these sediments, would have a serious impact on the quality of water in the rest of the Harbour • leading priority of the HHRAP is the remediation of combined sewer overflows (CSO) and the discharges of ammonia, phosphorus and suspended solids from Regional sewage treatment plants - expenditure for the construction of appropriate detention facilities for these CSO's should be accorded a high priority by H-W • storm water outflow pipes along the east bank of the RHC carry raw sewage - further investigations concluded that a large storm water culvert emptying into Buttermilk Creek (RHC tributary) is also contaminated • herbicides and elevated chloride levels caused by road salt must be assessed • another high priority of the HHRAP and Bay Area Restoration Council is the achievement of zero discharge or virtual elimination of the discharge into the Harbour eco-system of trace metals and trace organic materials (i.e. leachate from the four landfills located in the RHC watershed) • proposals for construction of an expressway in close proximity to these landfill sites should be subject to full and exacting assessment to ensure that present problems are not further aggravated - the examination should include the impacts of altered flow regimes in the RHC that could accelerate erosion at one or more of these site with a resulting increase in the release of toxic materials 	<p>The Region is proposing to approach the study through the development of a watershed study approach. The issues, objectives and proposed mitigation for water quality and quantity issues will be developed through that process. A number of stakeholders will be invited to participate in the process. This will provide a more coordinated approach to water management in the Red Hill Creek watershed. Mitigation strategies that are being considered include natural channel stream design, habitat restoration among others (see Section 3.0)</p>
	<p><u>Additional Comments by Agencies</u></p> <ul style="list-style-type: none"> • link study with fluvial geomorphology work • incorporate natural channel stream design • consider the creek and valley as a functioning system • stabilize the creek to maintain integrity of system • identify location, extent, sensitivity and significance of all components of watershed natural systems affected by the Expressway • consider the protection of the Red Hill Marsh wetland 	

CONCERNS/ ISSUES	DESCRIPTION	REGIONAL RESPONSE
FISH & WILDLIFE IMPACTS	<p><u>Public Comments</u></p> <ul style="list-style-type: none"> fisheries potential must be given proper weight in any examination of potential construction projects affecting the RHC deleterious impacts on current and potential fish populations must be taken into consideration habitat be maintained or created as necessary in the Harbour, or in Lake Ontario immediately adjacent to the Harbour or support nesting populations and other wildlife concern about the removal of trees RHC Valley is an essential corridor for wildlife and humans recent biological surveys reveal the incredible diversity of natural resources present main concern is that construction will endanger Provincial Class One Wetlands, Environmentally Sensitive Areas, Area of Natural Scientific Interest, Niagara Escarpment, etc. <p><u>Additional Comments by Agencies</u></p> <ul style="list-style-type: none"> high level of protection and impact mitigation is necessary when examining development in Escarpment Natural/Protection Area 	<p>This project will require compliance with the federal Fisheries Act. Mitigation and compensation strategies will be developed in conjunction with appropriate provincial and federal agencies in order to receive permits and approvals.</p> <p>The Region will be assessing the impacts of the road on wildlife and vegetation in order to determine feasible mitigation.</p>
RECREATIONAL IMPACTS	<p><u>Public Comments</u></p> <ul style="list-style-type: none"> preserve the greenspace along the RHC as done in Toronto's Rouge Valley concerned about negative impacts on the Bruce Trail 	<p>The Region has been coordinating this project with the trail development system by the Red Hill Valley Restoration Project. The watershed planning process will identify critical wildlife habitat linkages, and recreational trail systems such as the Bruce Trail, assess the impacts caused by the road, and propose mitigation.</p>
ACCESSIBILITY RESTRICTIONS	<p><u>Public Comments</u></p> <ul style="list-style-type: none"> the proposed expressway project will have serious impacts on public accessibility to and use of this significant greenspace, including the educational opportunities it affords 	<p>The Region is proposing to examine opportunities for pedestrian access to the Red Hill Valley as part of the decision making process and propose feasible options for consideration.</p>
HEALTH & SAFETY	<p><u>Public Comments</u></p> <ul style="list-style-type: none"> concerned about safety for school children traffic safety related to Q.E.W. Interchange concerned about the health and safety aspects of so many off ramps in such a short distance on the Q.E.W. 	<p>The Region meets annually with the Boards of Education to review the status of this project. This allows the Board to make decisions on transportation for school children.</p> <p>The design of the ramps and the interchange with the QEW must incorporate safety. The Region is coordinating this work with the Ministry of Transportation.</p>

CONCERNS/ ISSUES	DESCRIPTION	REGIONAL RESPONSE
SOCIO-ECONOMIC IMPACTS	<u>Public Comments</u> <ul style="list-style-type: none"> • general statement regarding socio-economic impacts • road will create long-term economic burdens due to urban sprawl 	<p>The need for the road is partly premised on support it brings to the industrial parks on the Mountain and the movement of people from the Mountain to the downtown employment centres and the Bayfront industrial area.</p>
WASTE IMPACTS	<u>Additional Comments by Agencies</u> <ul style="list-style-type: none"> • landfill wastes or contaminated soils found during construction should be Regional responsibility for ensuring proper disposal • indicate properties to be expropriated 	<p>The Region must comply with Provincial legislation such as the Environmental Protection Act which regulates uses and impacts associated with landfill sites. A process will be set in place to identify contaminated sites and propose strategies for managing contamination.</p>

Red Hill Creek Expressway North-South Section:
Proposed Assessment Process

*Questions &
Comments*

A comment sheet has been developed to assist stakeholders when providing input to the Proposed Assessment Process (see Appendix A). Please take a few moments to mail or fax your comments to the Region. When completing the Comment Sheet, please indicate:

- i) Are there other issues/concerns you feel are missing from Table 1?
- ii) What would you say are the three most important concerns/issues that must be addressed by the Expressway assessment process?

Stakeholder Consultation

2. STAKEHOLDER CONSULTATION PROGRAM

<i>Purpose</i>	The purpose of the Stakeholder Consultation Program is to establish a forum for government agencies, interest groups and the public (i.e., stakeholders) to exchange ideas and information, clarify positions and expectations, and work together to develop an Expressway design that minimizes impacts to significant environmental features, functions, and linkages occurring within the Red Hill Creek Valley watershed. In the context of this report, the term 'environment' means the natural, social, economic and cultural conditions that influence the watershed.
<i>Goal</i>	The goal of the consultation program is to share decision-making with all stakeholders in a meaningful and resource (money, time and energy) efficient way.
<i>Stakeholder Input</i>	Key components of the assessment process that require stakeholder input include: data collection, Expressway impact assessment, proposed Expressway design changes, impact mitigation and compensation plans, and the consultation program itself. Sections 3 and 4 of this document explain what each aspect involves and how stakeholder input can influence the recommended design.
<i>Consultation Activities</i>	<p>Consultation activities are the building blocks of a consultation program. Each activity has its own unique role to play in the assessment process. The principal features and proposed applications of each activity are summarized below:</p> <p>A Project Team consisting of Regional representatives will be responsible for managing the assessment process that eventually leads to a final Expressway design (including mitigation and compensation plans) which will be presented to Regional Council for approval. Key individuals participating in the study include:</p> <p>L. Dale Turvey, P.Eng. - Commissioner, Environmental Services and Transportation</p> <p>John van der Mark, P.Eng. - Director, Special Projects Office (SPO) (Project Director)</p>

**Red Hill Creek Expressway North-South Section:
Proposed Assessment Process**

Pamela Hubbard - Environmental Planner, SPO
(Project Environmental Co-ordinator)

Gary Moore, P.Eng. - Manager, Engineering, SPO
(Project Engineering Co-ordinator)

Chris Murray - Environmental Planner, SPO
(Project Impact Assessment Co-ordinator)

Mary Ellen Scanlon - Policy Analyst Planning and Development
(Public Consultation Co-ordinator)

All written correspondence should be addressed to John van der Mark with copies circulated (cc:) to others Project Team members as required.

A **Community Advisory Committee (CAC)** will be formed to address self-defined constituencies of interest as they relate to the assessment process described in Sections 3 and 4 of this report. For example, those who are concerned about stormwater runoff and related design solutions will decide who should represent their interests and how they should report back.

Each community group/organization that has previously expressed an interest in the project will be invited to nominate a representative to attend regularly scheduled meetings with the Project Team and its technical support staff. Nominees will be asked to provide input and advice on matters related to their groups area(s) of constituent interest.

All other organizations that wish to be represented on the CAC, must contact the Special Project Office (25 Main Street West, Hamilton, Ontario, L8P 1H1 tel: (905) 546-4277 fax: (905) 546-2385 before the end of the 30-day Proposed Assessment Process review period.

A **Government Agency Committee (GAC)** will provide a forum for federal/provincial agencies, and municipalities to provide direction on matters related to their mandated areas of responsibility.

An **Impact Assessment and Design Team (IADT)** will be formed to assist the Project Team, CAC, and GAC with all technical matters

Red Hill Creek Expressway North-South Section: Proposed Assessment Process

related to Expressway design, baseline data collection, impact assessment, mitigation/compensation, monitoring, and general public consultation.

Assessment Process Schedule

Figure 2 illustrates how key steps in the proposed assessment process (specific details are discussed in Sections 3 and 4) and the aforementioned consultation activities are integrated.

Dispute Resolution

Where ever possible Project Team representatives will try to resolve stakeholder concerns before they become issues. However, when issues are generated, the Project Team proposes to utilize one or more of the following dispute resolution approaches:

- Provincial Facilitators Office - to resolve inter-provincial approval and permitting issues;
- Local Political Representatives - to resolve community issues; and
- Third Party Mediators Mutually Acceptable to all Parties - to resolve issues between areas of constituent interest.

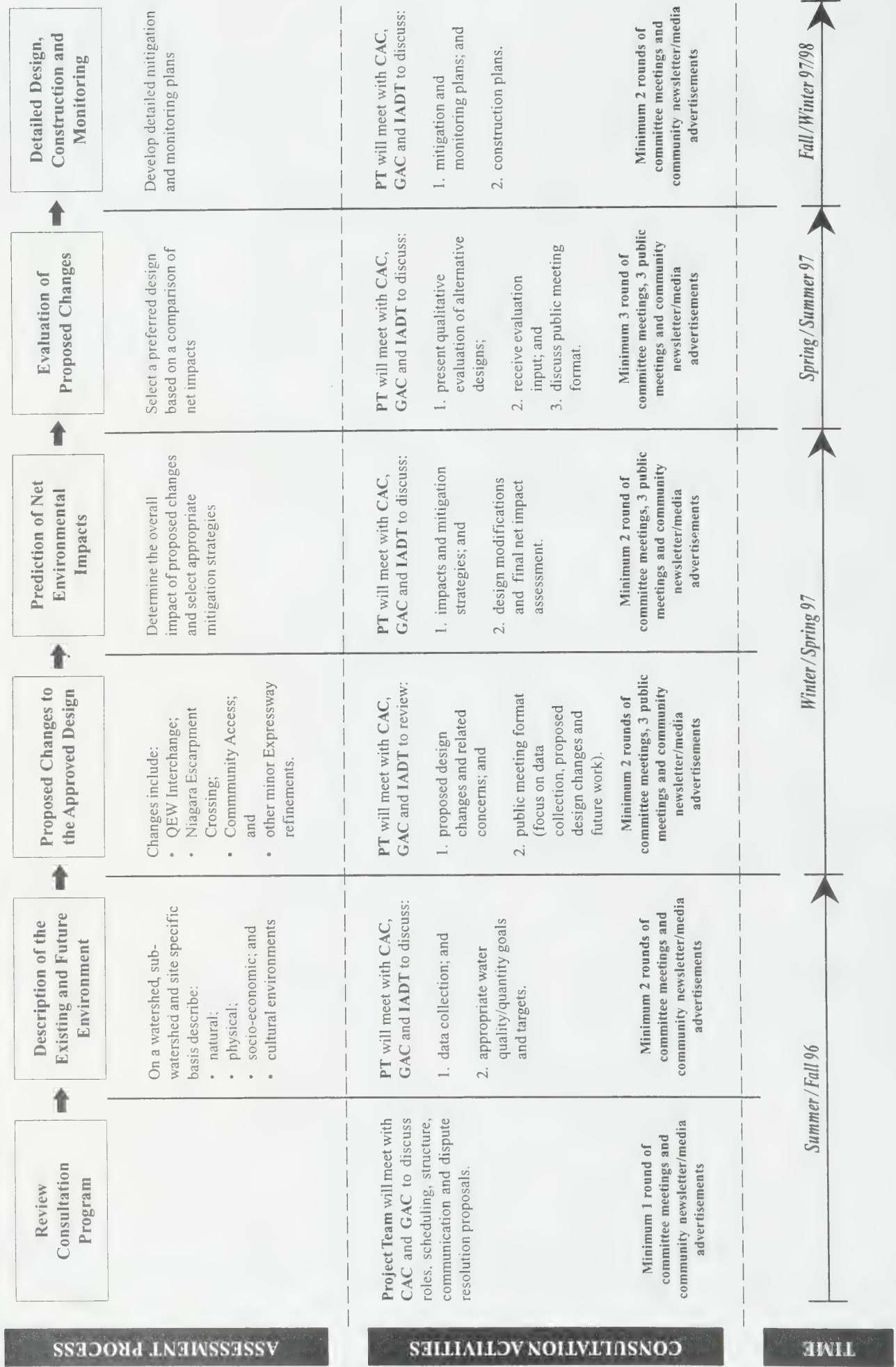
Questions & Comments

When completing the Comment Sheet contained in Appendix A, please indicate:

- i) Do you have any suggestions that will improve the stakeholder consultation program?
- ii) Can you suggest other dispute resolution techniques we should consider?

ASSESSMENT PROCESS SCHEDULE

Figure 2



PT = Project Team

CAC = Community Advisory Committee

GAC = Government Agency Committee

IADT = Impact Assessment and Design Team

Approvals/Permits and Impact Assessment

3. APPROVALS/PERMITS AND IMPACT ASSESSMENT

Hearing Board Approval and Conditions

The Board decision of 1985 approved both the East-West and North-South sections of the Expressway. This approval carries a number of conditions that must be met prior to construction. The Board approval and conditions that apply to the Expressway North-South section (subject of this report) can be summarized as follows:

The Approved Expressway

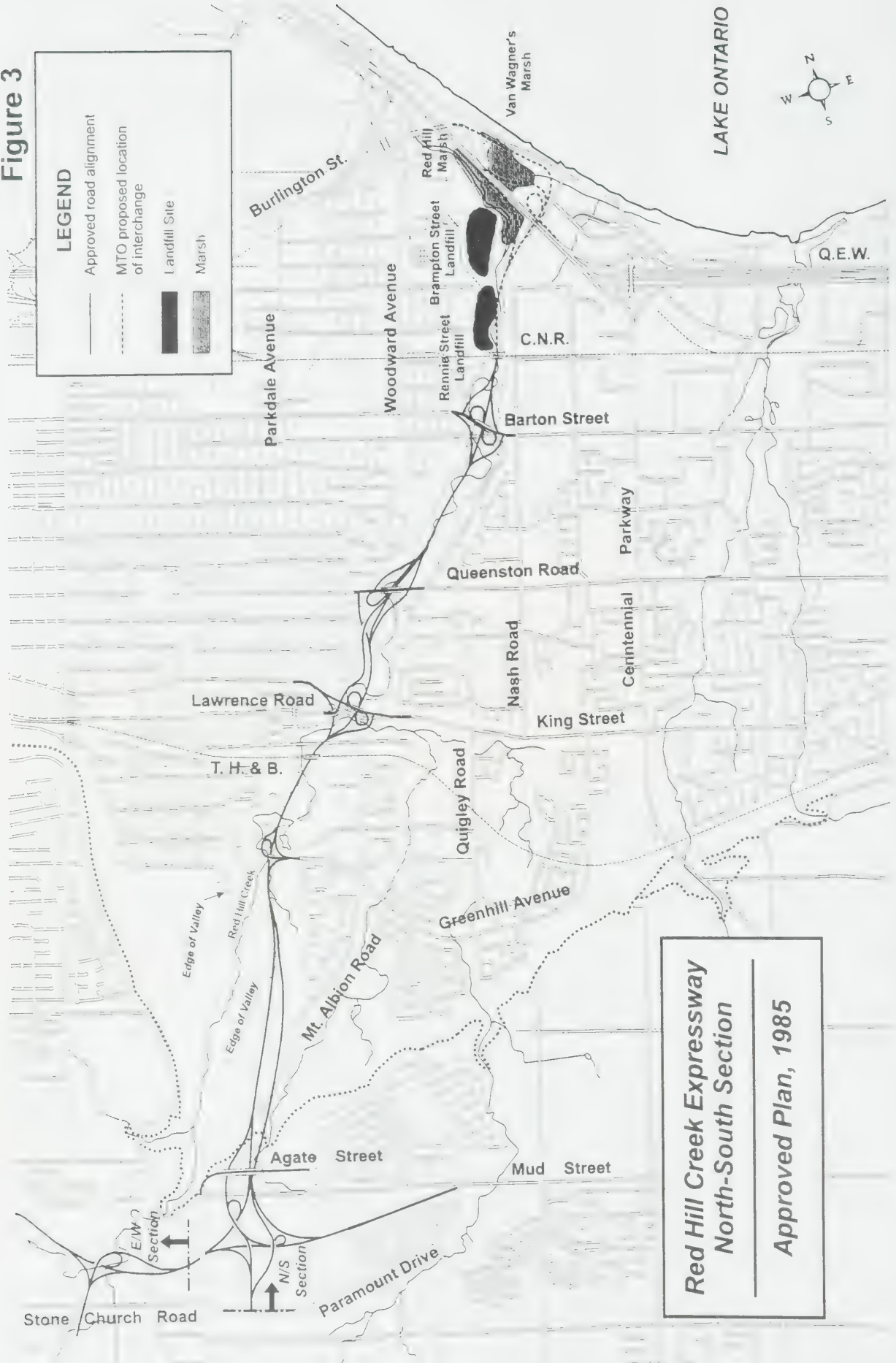
- 100 km/h design speed (this controls the vertical and horizontal roadway design);
- 90 km/h posted speed limit (this controls the speed vehicles can legally travel);
- ability to stage construction from a 4 lane rural roadway to a 6 lane freeway (the rural/freeway distinction relates primarily to the type of drainage that is typically used, i.e., ditches vs. curb and gutter);
- roadway corridor and alignment;
- an extra southbound lane between Greenhill Avenue and Mud Street for slower moving vehicles climbing the Escarpment; and
- interchanges located at Mud Street, Greenhill Avenue, King Street, Queenston Road, Barton Street, and QEW.

Note: Figure 3 illustrates the North-South Expressway alignment that was approved in 1985.

Conditions of Approval

The conditions of approval that accompanied the Board decision are included in Appendix B. In summary, the conditions generally cover the issuance of permits under the Niagara Escarpment Planning and Development Act, Conservation Authorities Act, Lakes and Rivers Improvement Act, and the following:

Figure 3



- That upon completion of construction of the undertaking the Region shall establish a system of monitoring with respect to noise, air quality and erosion (see Schedule A1 in Appendix B).

In 1990, the Region constructed an air quality monitoring station and are awaiting direction from the Ministry of Environment and Energy on its installation. Noise and erosion monitoring plans will be developed.

- That a proper pedestrian right-of-way be provided across the expressway at Melvin Avenue (see Schedule A 2 - Appendix B).

During the Preliminary Design in 1989, two possible locations for a pedestrian bridge were presented for public input. The final location will be determined as part of the design and public consultation (see Section IV).

- The archaeological site known as the Spera site must be subject to mechanized topsoil stripping prior to Stage 2 construction (see Schedule A 3 - Appendix B).

This work will be completed as per requirements.

- That results from stormwater runoff and erosion studies to be completed as part of the design process for the undertaking herein be incorporated into the design of any future master plan of recreation (see Schedule B 2 - Appendix B).

The above studies will be made available to the City of Hamilton as they are produced. The Region is working with the Red Hill Valley Restoration Project to provide information as it becomes available to ensure that the projects are comparable.

- That detailed grading plans be submitted for Niagara Escarpment approval to minimize the effects of construction on Escarpment and Valley slopes (see Schedule B 3 - Appendix B).

**Red Hill Creek Expressway North-South Section:
Proposed Assessment Process**

A grading plan will be submitted for approval prior to any construction work on the Escarpment or Valley.

- That a detailed tree preservation and planting plan be submitted for Niagara Escarpment Commission approval (see Schedule B 4 - Appendix B)

The above plans will be submitted through the design process. A tree preservation plan was prepared but will be updated. Planting plans will be developed in conjunction with the preparation of detail designs.

- That a limit of work fence be erected 10 feet from the top of any slope and adjacent to any forested areas to prevent any unnecessary damage outside the construction area (see Schedule B 5 - Appendix B).

The above will be implemented as part of preconstruction activities.

- That the works be constructed in accordance with the recommendations of the hydrologist ...(or as may be modified through the detailed engineering process)... with respect to the size and elevation of creek channels and culverts...and the size and elevation of storm water storage areas (see Schedule C 1 - Appendix B).

That the detailed proposals for the placing of fill, erosion control, sediment control... be submitted to the Hamilton Region Conservation Authority for approval.

This work will be completed as per requirements.

- That detailed construction and design plans be submitted to the Ministry of Natural Resources for review and approval pursuant to the Lakes and Rivers Improvement Act (see Schedule C 2 - Appendix B).

The Region will continue to work closely with both the Hamilton Region Conservation Authority (HRCa) and the Ministry of Natural Resources (MNR) to ensure that erosion is

Red Hill Creek Expressway North-South Section: Proposed Assessment Process

minimized and sediment is prevented from entering streams. The approach to creek channels and culverts has changed considerably since the conditions of approval were written. The Region is working with MNR and HRCA to ensure that the creeks are enhanced and road designs minimize impacts. This will continue for the north-south section as well. Both agencies will receive detailed design plans for approval prior to construction.

The Region must comply with the aforementioned approval and conditions before and during Expressway construction. There are, however, other legislation, policy and guidelines that apply and must be respected.

Applicable Legislation, Policies, and Guidelines

A number of impact assessment requirements have evolved since approval of the Expressway in 1985. These include the federal Fisheries Act, provincial Wetlands Policy, Stormwater Management Guidelines, local Erosion and Sedimentation Guidelines, to name a few. The Region is aware of these new policies and guidelines and has worked with agencies to implement them on the East-West section of the Red Hill Creek Expressway. The result has led to the development of innovative designs and mitigation.

The following lists the federal and provincial legislation, policies and guidelines that the Region anticipates to be applicable to this project even if no changes to the Expressway approved in 1985 are made:

Federal Legislation (to be confirmed)

- Fisheries Act - for authorization and compensation to fish habitat
- Canadian Environmental Assessment Act
- Migratory Birds Convention Act
- Navigable Waters Protection Act

Provincial Legislation (to be confirmed)

- Lakes and Rivers Improvement Act - for permits to work within a water course

Red Hill Creek Expressway North-South Section: Proposed Assessment Process

- Conservation Authorities Act Regulations - for permits to develop, fill or grade within a flood plain
- Niagara Escarpment Plan - for permits to develop within the Niagara Escarpment Planning Area
- Environmental Protection Act - to obtain Certificate of Approval for stormwater management and to address issues of compliance with noise and air quality. If site decommissioning requires a risk assessment approach or if site assessment indicates that there is a detrimental effect on the environment, MOEE will be involved.
- Ontario Water Resources Act - for any temporary or permanent diversions within a water course
- Rare and Endangered Species Act
- Ontario Heritage Act
- Planning and Development Act - to deal Official Plan requirements

Note: Since the federal Fisheries Act will apply to this project, a number of other federal interests may be identified through the screening process under the Canadian Environmental Assessment Act.

Provincial Policies/Guidelines influencing impact assessment:

- Water Management on a Watershed Basis: An Ecosystem Approach, MOEE, 1993
- Subwatershed Planning, MOEE, 1993 (Interim Guidelines)
- Towards an Ecosystem Approach to Land Use Planning: A Biophysical Environment Perspective, MOEE, 1992
- MOEE Water Management Policies, Guidelines, Provincial Water Quality Objectives July, 1994 (Blue Book)
- Guidelines for Protection and Management of Aquatic Sediment Quality in Ontario, MOEE 1993 and companion document
- Fill Quality Guidelines for Lakefilling in Ontario Application of Sediment and Water Quality Guidelines to Lakefilling, June 1992,
- Stormwater Best Management Practices MOEE 1991
- Stormwater Management Practices Planning and Design Manual, MOEE , June 1994

**Red Hill Creek Expressway North-South Section:
Proposed Assessment Process**

- Urban Drainage Design Guidelines, MOEE, MMA, MTO, MEA, ACAO, UDI, 1987
- Erosion and Sediment Control Guidelines for Construction Sites, MOEE, 1987
- Evaluating Construction Activities Impacting on Water Resources, 1995
- Snow Disposal and De-Icing Operation in Ontario, MOEE, 1975
- Sediment Assessment: A Guide to Study Design, Sampling and Laboratory Analysis, July 1993
- Keeping Soil on Construction Sites, Hamilton Region Conservation Authority, 1994
- Fish Habitat Protection Guidelines for Developing Areas, MNR, March 1994
- Noise Control Guideline for Class Environmental Undertakings, MOEE, February 1980
- A Protocol for Dealing with Noise Concerns During the Preparation, Review and Evaluation of Provincial Highways Environmental Assessments. February, 1986. Ministry of Environment and Energy and Ministry of Transportation
- Various Ministry guidelines on consideration of agency mandates in assessment processes
- Revised Tables of objectives for Ministry of Environment and Energy's Publication 'Water management', MOEE
- Resolution of Well Water Quality Problems Resulting from Winter Road Maintenance, MOEE Drinking Water Quality, MOEE
- Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities, MOEE
- Evaluating Construction Activities - Highways and Bridges, MOEE
- Resolution of Groundwater Interference Problems, MOEE

Regional and Inter-regional Policies influencing impact assessment:

- Erosion and Sediment Control Guidelines for Construction Sites, 1987 HRCA and Halton CA
- Regional Official Plan
- Hamilton Harbour Remedial Action Plan

Red Hill Creek Expressway North-South Section: Proposed Assessment Process

Impact Assessment Process

The following describes the impact assessment process the Region will use to comply with the aforementioned legislation, policy and guidelines; assess and evaluate impacts associated with the North-South Expressway approved in 1985 and proposed design changes (see Section 4); identify and select appropriate mitigation and compensation measures; and develop monitoring programs. This process will include:

- i) Description of the existing/future environment - to determine significant environmental features, linkages, and functions of the Red Hill Creek Watershed that could be impacted by the approved North-South Expressway design and proposed changes;
- ii) Prediction of Net Environmental Impacts - to determine the net impacts (impact of the design after mitigation and/or compensation measures have been developed) of the approved North-South Expressway design and proposed changes;
- iii) Evaluation of the Proposed Design Changes in Comparison to the Approved Expressway - to demonstrate that proposed changes are less disruptive to the environment than the approved Expressway design; and
- iv) Detailed Design and Construction Monitoring Commitments - to provide assurances that decisions reached during the assessment process are reflected in detail design and construction.

Description of the Existing Environment

The environment is described in order to predict the direct and indirect impacts the approved Expressway and proposed design changes will likely have on the environment and to develop appropriate mitigation, compensation, and monitoring measures. In this process, the environment directly affected generally refers to all features within the pathway of the Expressway, e.g., Niagara Escarpment, Red Hill Creek, associated natural habitats, development that was not previously located within the approved corridor, etc.. The environment indirectly affected generally includes the Hamilton Harbour ecosystem, Red Hill Creek tributary system, neighbourhoods adjacent to the Expressway, commercial/industrial parks, etc..

The environment can be divided into the following categories:

- biological (e.g. aquatic and terrestrial flora and fauna, and avifauna)
- physical (e.g. geology, soils, hydrogeology, water quality and quantity)
- social (e.g. public access, land use, noise levels, air quality)
- cultural (e.g. recreation facilities, heritage structures, archaeological sites)
- economics (e.g. industry, businesses)

To properly assess the direct and indirect impacts of the Expressway, stakeholders require data to be collected at two levels:

- i) watershed/subwatershed; and
- ii) site specific.

Collection of Data on a Watershed Basis

The approved Expressway and proposed design changes are located entirely within the Red Hill Creek watershed (see Figure 4). In addition, there are a number of other services (i.e., hydro lines, stormsewers, etc.), residential/business/industrial developments, trail systems, and other recreational opportunities either existing or proposed within this watershed. All developments have the ability to impact on the quality and quantity of the environment within the watershed.

In recent years the province as well as other organizations have recommended that watershed plans be prepared in order to balance natural, socio-economic and cultural interests. Comments provided by provincial agencies and local interest groups early in the development of the Proposed Assessment Process clearly stated a need to assess environmental impacts in an ecosystem/watershed context.

What is a Watershed Plan?

In general, Watershed Plans are initiated with the objective of managing water, land/water interactions, aquatic life and aquatic resources within an identified watershed boundary. The specific goals

Figure 4



Red Hill Creek Watershed Boundaries

and targets of each Watershed Plan will vary depending on the environmental characteristics and development pressures that co-exist within the watershed.

Some of the potential benefits of a Red Hill Creek Watershed Plan are described as follows:

- provides a coordinated approach to setting goals and targets that will result in the most efficient use of resources and will, to the extent feasible, protect, manage and/or conserve various environmental interests;
- provides the basis for the development of stormwater management objectives for quality and quantity; and
- provides the basis for developing effective mitigation and monitoring strategies for all development, including the Expressway.

How would environmental interests and the Expressway be accommodated in a Watershed Planning approach?

The proposed Watershed Planning approach will:

- identify & assess significant natural and physical features including habitat linkages, ecological or physical functions and other existing/future development;
- assess problem areas, e.g., erosion/unstable slopes, that exist or will exist as a result of future development (both Official Plan and Expressway);
- establish stormwater quality/quantity management goals and targets for tributary systems;
- **(IMPORTANT)** determine the degree to which solutions to the aforementioned goals/targets are functionally linked to the Expressway versus other development interests (existing or proposed). If linked to the Expressway, the Project Team in consultation with relevant stakeholders will develop and evaluate stormwater management strategies at an appropriate

level of detail. If solutions are not linked to the Expressway, other municipal proponents in consultation with relevant stakeholders will be encouraged to investigate appropriate strategies;

- identify parameters and responsibility for monitoring; and
- establish policies and criteria for the protection and enhancement of valley features and linkages in the context of Expressway development.

Figure 5 illustrates the context in which the Expressway assessment process fits into the Watershed Planning process.

How should the Watershed Planning approach be developed?

The Watershed Plan must be developed in cooperation with the Community Advisory Committee, Government Advisory Committee, Impact Assessment and Design Team, and Expressway Project Team identified earlier in this report. Key stakeholders and participants in a watershed study include:

- The Hamilton Region Conservation Authority,
- Niagara Escarpment Commission,
- Regional departments dealing with roads, sewer and storm water services and planning,
- local municipalities (Cities of Hamilton and Stoney Creek and the Town of Glanbrook),
- property owners,
- interest groups,
- interested public, and
- Provincial and Federal agencies.

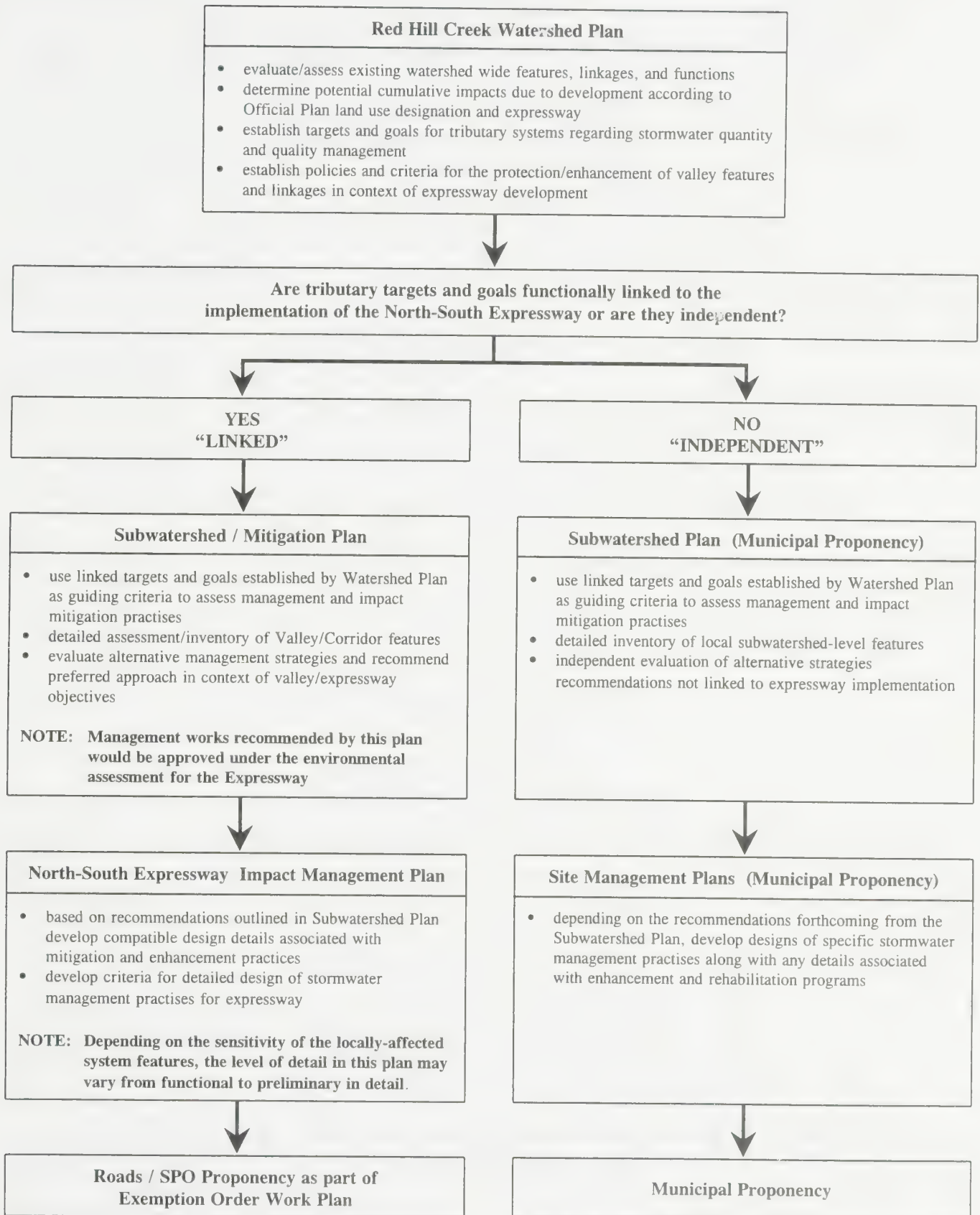
Note: Once Expressway interests are met, the Project Team will no longer maintain lead responsibility for completing the Watershed Plan.

Watershed Data Assessment and Collection

Numerous Provincial and Regional studies have been carried out in the watershed in the last few years (see Appendix C). These data will

**RED HILL CREEK
NORTH-SOUTH EXPRESSWAY
WATERSHED PLANNING PROCESS**

Figure 5



be assessed by the Impact Assessment and Design Team in the first phase of the study to determine if additional field work is required.

The Red Hill Valley Restoration Project will provide a valuable source of data on various watershed features and as reports become available, they will be reviewed by the Impact Assessment and Design Team and incorporated into the analysis.

The data assessment and collection will identify environmental features, functions and linkages that are significant in a watershed context. The degree of significance will be assessed through:

- federal, provincial and municipal legislation, policies and guidelines that specify the significance of various features (e.g. federal Fisheries Act); and
- regional and inter-regional policy (e.g. Hamilton Harbour Remedial Action Plan, Red Hill Valley Restoration Project, public input).

The types of data to be assessed and collected by the Red Hill Creek Expressway Project are those data that will specifically be required to assess the impacts associated with the Expressway. This includes:

- hydrogeology;
- hydrology;
- water quality;
- fisheries;
- terrestrial features, functions, and linkages; and
- land use (existing and proposed)

The consultant terms of reference for each of the above data requirements are included in Appendix D. More detailed terms of reference will be developed following assessment of the data and collection of additional data and the results of the watershed study.

Assessment of Data for Site Specific Areas

Site specific data will be collected in areas where: the Expressway directly impacts significant watershed features, functions and linkages;

changes to the approved roadway alignment are being considered; and mitigation/compensation is being proposed.

The following inventory components will be assessed in detail for site specific areas:

Physical/Biological

- Hydrogeology
- Fisheries
- Fluvial Geomorphology
- Geotechnical
- Water Quality
- Terrestrial
- Hydrology
- Hydraulics

Social/Economic

- Land Use
- Property Ownership & Rights (Easements/Leases)
- Economic/Businesses/Industry
- Noise
- Air Quality
- Significant Views and Vistas
- Recreational Features

Cultural

- Archaeological and Heritage Resources.

Site Contamination

- Landfill locations
- Potentially contaminated sites within or adjacent to the road corridor.

Utilities

- Location of utilities (i.e. pipelines, sewers, watermain, hydro)

***Prediction of Net
Environmental Impacts***

To assess the positive or negative impacts the Expressway will have on significant watershed features, functions and linkages, it will be necessary to determine whether or not impacts can be avoided through minor design changes and/or reduced through mitigation or

compensation. Net impacts refer to the impact that remains after mitigation and/or compensation is applied. Once determined for both the approved Expressway and proposed design changes (see next section), decisions regarding the selection of the most appropriate design can be made.

Mitigation and Compensation

The type of mitigation and compensation measures which will be considered in determining net environmental impacts are described below. The feasibility of applying some of the mitigation measures will be determined after considering the existing environment and stakeholder consultation.

The Region will incorporate as a minimum the following into plans and contracts for construction:

- preparation & implementation of an erosion and sediment control plan as per Region approved guidelines;
- control of construction access to minimize damage to vegetation and to the stream;
- timing constraints on in-stream works;
- phasing of construction to minimize negative impacts on in-stream water quality, and to minimize disruption to terrestrial vegetation and habitat;
- landscaping plan for corridor and interchanges using indigenous plantings;
- tree preservation plan for those areas that can be preserved within the corridor and to ensure minimal impact on areas adjacent to the corridor;
- natural channel stream design where creek modifications are required and where necessary to ensure stabilization of overall system;

Red Hill Creek Expressway North-South Section: Proposed Assessment Process

- riparian planting in conjunction with natural channel stream design work and to assist in creek stability;
- landscape maintenance plan to ensure that plantings are established;
- stormwater management plan;
- control runoff quality from roadway; and
- culvert/bridge design to allow fish migration.

The Region will consider a number of mitigation techniques. The decision to use any of the techniques will be based on an assessment of the overall benefit and effectiveness of the technique for the specific area and feature in question as well as the technical feasibility. The types of mitigation that will be considered include:

- wetland creation & enhancement;
- in-stream fish habitat enhancement;
- assessment of existing stream barriers to determine if removal is feasible;
- culvert/bridge sizing to allow wildlife migration;
- roadway type (i.e., at grade, elevated on structure) to avoid or reduce impacts;
- transplanting significant vegetation where possible;
- control of roadway water runoff to maintain or reduce existing peak flows and volumes;
- potential combination of stormwater facilities within watershed to address existing concerns in concert with roadway design;
- culvert/bridge, i.e., sizing, to provide adequate flood flow capacity to Regionally acceptable levels and where necessary adjust road grades to achieve freeboard;

- provisions to maintain Regional recharge/discharge areas through co-ordination of design and mitigation;
- bioengineering-natural slope stabilization methods;
- noise barriers (walls or berms);
- soil management plan; and
- site clean-up for contaminated sites.

Through the GAC and CAC, government agencies, interest groups and the public will participate in the review of the prediction of impacts and the proposed mitigation and monitoring strategies.

Evaluate Proposed Changes

A number of the proposed changes to the approved Expressway design (see Section 4) have been developed in consultation with citizens in the Mount Albion/Lawrence area (1989) and/or the Ministry of Transportation (1993-95). At this point in the assessment process, the Project Team, in consultation with government agencies, interest groups and the public, will determine whether or not proposed changes are less disruptive to the environment than the approved Expressway design.

Evaluation Categories, Factors, and Indicators

The Project Team in consultation with the aforementioned stakeholders will develop evaluation categories, factors, and indicators that reflect the significant features identified through the watershed plan and site specific inventories. It is important not to predetermine what is significant until after data collection efforts are completed.

Methodology for Evaluation

A number of evaluation methodologies exist, however, two general approaches are predominant; quantitative and qualitative.

Quantitative methodologies, such as weighting/scoring, attempt to place a numerical value on an impact to a significant feature in an attempt to identify the significance of the impact. This approach can

be useful in very complex projects for which there is a large amount of quantifiable data. However, despite the best efforts of professionals, weighting/scoring remains plagued with subjectivity.

In most cases, a qualitative evaluation of impacts is sufficient to describe the relative significance of impacts. Although still subjective, a qualitative evaluation approach focuses on the explicit trade-offs that favour one alternative over another as opposed to a comparison of weighted scores. The overall significance of the impacts is determined through a consensus building approach rather than through an addition of numerical values.

In the assessment of the proposed changes to the approved Expressway alignment, a **Qualitative** evaluation methodology will be utilized.

The results of the net impact assessment will be presented to stakeholders for discussion and input prior to selection of a preferred change.

Documentation

The impact assessment process leading to a preferred alternative in the areas of proposed changes will be documented in an Impact Assessment Report. The Impact Assessment Report will include a description of:

- the impact assessment process;
- the results of the consultation and how it influenced decision-making;
- the mitigation to be carried forward into design and construction;
- a commitment to develop a monitoring program to be implemented before, during and after construction; and
- the changes that will be made to the approved Expressway alignment to the level of design necessary to predict impacts and mitigation.

The above document will be ratified by Regional Council and circulated to government agencies, interest groups and the public involved in the consultation.

***Detailed Design and
Construction
Monitoring***

Once preferred designs have been selected and mitigation has been determined, more detailed designs will be undertaken and more specific mitigation strategies will be developed i.e. stormwater management designs, tree preservation plans, landscaping plans, natural channel stream design, and monitoring plans.

The process used to decide on final design criteria for structures and the main line of the road will be the same type of process described above, i.e., generation of design alternatives, evaluation and selection of alternatives and selection of the most feasible design. Again, this will be carried out in consultation with the Government Agency Committee and the Community Advisory Committee.

Documentation

This stage will result in a Design Report that:

- details mitigation strategies; and
- details construction and post construction monitoring plans

This document must be accepted by all of the agencies that grant permits and approval because this forms the basis for their approvals.

Construction

Construction is a critical stage in the project since it is the stage where all of the planning and mitigation measures are implemented. The construction process will involve two primary activities to ensure that negative environmental impacts are minimized. The following is the proposed process for carrying out construction:

1. Contract Preparation

The contract document will be written to include provisions which advise the contractor of environmental constraints, limitations to construction access, and direction regarding construction practices

which will be required. In addition the contract document will provide the Regional Municipality with the means to ensure that proper construction practices are implemented. Specification of precise requirements to be included in the contract documents will be based on the results of the foregoing study, however the preparation of contract documents for construction will include provisions, as necessary to achieve the following:

- education of potential contractors through a pre-bid meeting and site visit to point out the environmental constraints to be included in the contract;
- development of contract drawings and specifications that clearly indicate all environmental sensitivities and activities required to minimize environmental impacts, for example, timing constraints, mitigation measures for erosion and sediment control, construction access, tree preservation plans, etc.;
- staging and co-ordination of various components of construction to minimize disturbance to the environment and to be compatible with mitigation strategies;
- provisions for sediment and erosion controls, with primary emphasis on control of erosion through staging of grading to minimize unnecessary exposure of soils to erosion processes and stabilization of exposed surfaces as soon as possible following construction;

Contract provisions will include:

- specification of erosion and sediment control measures and related construction practices, including location of such measures on the design plans.
- requirements for temporary seeding/stabilization of exposed soil surfaces between construction activities to minimize exposure of soils to erosive processes.
- requirement for the contractor to provide de-watering plans to the Regional Municipality of Hamilton-

Red Hill Creek Expressway North-South Section: Proposed Assessment Process

Wentworth for review and approval by the regulatory agencies prior to construction.

- requirement for the contractor to maintain and modify sediment and erosion controls as necessary to maintain optimum performance.
- timing of in-stream works in accordance with MNR requirements for protection of fish habitat. Provision will be included within the contract which reference Ministry of Natural Resources timing restriction dates or other indicators such as water temperature which will be determined based on the impact assessment and design process; and
- minimize environmental damage due to construction access and storage of materials.

Consideration will be given to including:

- penalties to contractors for un-necessary damage to natural areas be imposed and remediation provided;
- delineation of limits of work and storage areas on the design plans and establishment of such limits in the field prior to construction;
- establishment of fuel storage and fuelling areas for equipment away from the watercourse and outside of flood prone areas; and
- requirement to maintain spill containment equipment on site at all times during construction.

2. Construction Management

Construction management will play a vital role in ensuring environmental protection objectives are realized. The final arrangements for construction supervision will be based on results of the impact assessment and design process, however it is anticipated that construction management will include:

Red Hill Creek Expressway North-South Section: Proposed Assessment Process

- consideration for an independent Environmental Site Manager (ESM) to coordinate site activities and ensure compliance;
- establishment of a multi-disciplinary management team, headed by the ESM, with expertise in the disciplines of engineering, environmental monitoring, terrestrial and fisheries resources to provide timely input to construction issues as they arise;
- a rigorous reporting protocol with a built-in contingency plan for violations;
- reinforcement of environmental constraints with successful contract bidder and utility companies through a pre-construction meeting to review environmental constraints, staging and construction practices;
- monitoring of construction practices, and environmental indicators (ie. water quality parameters) by a qualified environmental inspector; and
- regular meetings with various contractors, inspectors, and agency staff to coordinate construction staging, and review construction practices. Revisions to staging and construction practices will be incorporated as necessary.

3. Construction Staging

Subject to the finalization of the detailed design and subsequent mitigation and compensation requirements, the Region proposes the following construction sequence for the section adjacent to the Red Hill Creek:

- Barton Street Interchange and CNR grade separation;
- stream relocation and rehabilitation (using natural channel stream design techniques);
- structures across streams;

- main line grading and interchange construction (north of Greenhill); and
- mainline paving and related works.

The sequence should allow the majority of the stream relocation work to be done in the "dry" and minimize the in-stream and overbank vegetation prior to stream diversion. It also allows maximization of establishment of buffer areas (where required) between the new stream location and the Expressway related construction.

The above sequence may change depending on the detailed mitigation strategies developed during the study and requirements of regulatory agencies.

Post Construction Monitoring

A monitoring program will be established that reflects the impacts to various significant features as well as legislative obligations. The conditions of approval for the Expressway already provide for air quality and noise monitoring. Monitoring programs may also be established for water quality, water quantity, stormwater management, sediment and erosion, and effectiveness of other mitigation. The watershed plan will establish responsibilities for monitoring these features in the watershed. Site specific monitoring may be developed as part of the detail design or impact assessment process.

The final phase of the project will involve implementation of a post construction monitoring program. The specifics of the monitoring program cannot be detailed in advance of the watershed planning or the design of the roadway. However, the objectives of the monitoring program will be:

- to confirm the predictions made in the impact assessment process and make changes accordingly;
- to evaluate the effectiveness of the specific mitigation strategies in the long term;
- to evaluate the overall health of the valley ecosystem;

**Red Hill Creek Expressway North-South Section:
Proposed Assessment Process**

- to evaluate the operational procedures related to the roadway and associated facilities; and
- to allow for the refinements of proposed mitigation strategies to address targets and objectives.

Monitoring which is being undertaken for the Dartnall Road interchange as part of the fisheries compensation agreement on that project, is expected to provide useful information which may be utilized in the development of the monitoring program for this part of the project.

***Questions &
Comments***

When completing the Comment Sheet contained in Appendix A, please indicate:

- i) Are there other applicable legislation, policies, and guidelines that should be considered when carrying out the assessment process?
- ii) Do you have any comments concerning the watershed approach the Region is proposing in terms of data collection, impact prediction and the Expressway's overall involvement?
- iii) What changes, if any, should be made to the consultant terms of reference (see Appendix D)?
- iv) What other types of mitigation/compensation measures should be considered?
- v) Do you support the use of a qualitative 'trade-off' approach when evaluating proposed changes to the approved Expressway?
- vi) What other considerations should be addressed when developing a construction monitoring plan?

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**Red Hill Creek Expressway North-South Section:
Proposed Assessment Process**

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- v) Do you support the use of a qualitative 'trade-off' approach when evaluating proposed changes to the approved Expressway?
- vi) What other considerations should be addressed when developing a construction monitoring plan?

Expressway Design Changes and Environmental Assessment Act Approvals

4. EXPRESSWAY DESIGN CHANGES AND ENVIRONMENTAL ASSESSMENT ACT
APPROVAL

Background

As indicated earlier, the Region obtained approval from the Joint Board, in 1985, to proceed with an undertaking to construct an Expressway from Highway 403 to Queen Elizabeth Way (QEW). The decision of the Joint Board was confirmed in March 1987 following the consideration of a Petition to Cabinet.

The construction of the East-West "Mountain" component of the Expressway commenced in 1990 and is expected to be completed from Highway 403 to Dartnall Road in 1998. Construction of the North-South "Valley" section began in 1990 with the CP Rail/King Street and Queenston Road bridges. This work was completed shortly after funding was withdrawn by the provincial government. No other freeway related construction has taken place within the Valley.

Following the cancellation of funding, the Region and the Province entered into lengthy discussions focused on the need for the Expressway and the suitability of alternative routes. In 1994, the provincial government asked David Crombie, to review the project and recommend a solution which would be acceptable to all parties.

In his March 1994 report, Crombie acknowledged the need for a four-lane road in the vicinity of Red Hill Valley after examining other routes such as Highway 20 and Fruitland Road. The Crombie proposal utilized Woodward Avenue, Mount Albion Road and portions of the Red Hill Valley. The proposed road would function as an arterial roadway and not as an Expressway which the Region had approval for.

The Region's review of the Crombie proposal revealed some serious limitations with an arterial roadway design, specifically in terms of traffic capacity, safety, cost and environmental benefit. The Region continued to investigate alternatives to the Crombie proposal in an effort to reduce impacts to the Valley while still providing an adequate level of transportation service. This process took into consideration public concerns regarding impacts to the Valley and adjacent communities. This resulted in the development of a proposal by the Region for modifications to the approved Expressway

alignment, in particular at the QEW interchange and the Niagara Escarpment crossing area.

Now that provincial funding has been reinstated, the Region is proposing an assessment process that will finalize major changes to the approved design.

Board Decision

The first issue the Region must consider is what approvals, if any, are required under the Environmental Assessment Act (EAA) in order to proceed with the final design and construction of the North-South Valley section of the Expressway. As far as approval under the EAA to proceed to construct an Expressway in the Red Hill Creek Valley is concerned, there is no issue. This was made clear by the Joint Board where it stated:

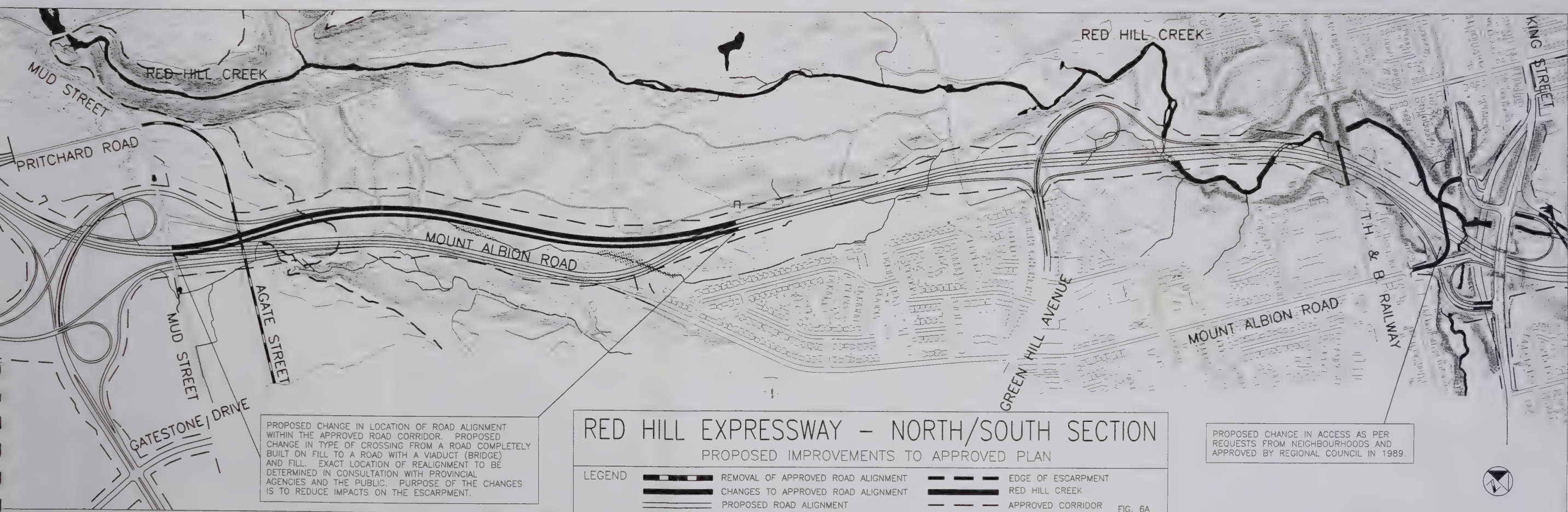
The Board has carefully considered all of the evidence and the argument submitted in the lengthy proceeding. The first conclusion which the Board has reached is that there is really one dominant issue throughout this whole proceeding and that issue is: 'Should the Regional Municipality of Hamilton-Wentworth be given the necessary statutory approvals to construct a road in the Red Hill Creek Valley?' It is the opinion of this Board that approval should be given.

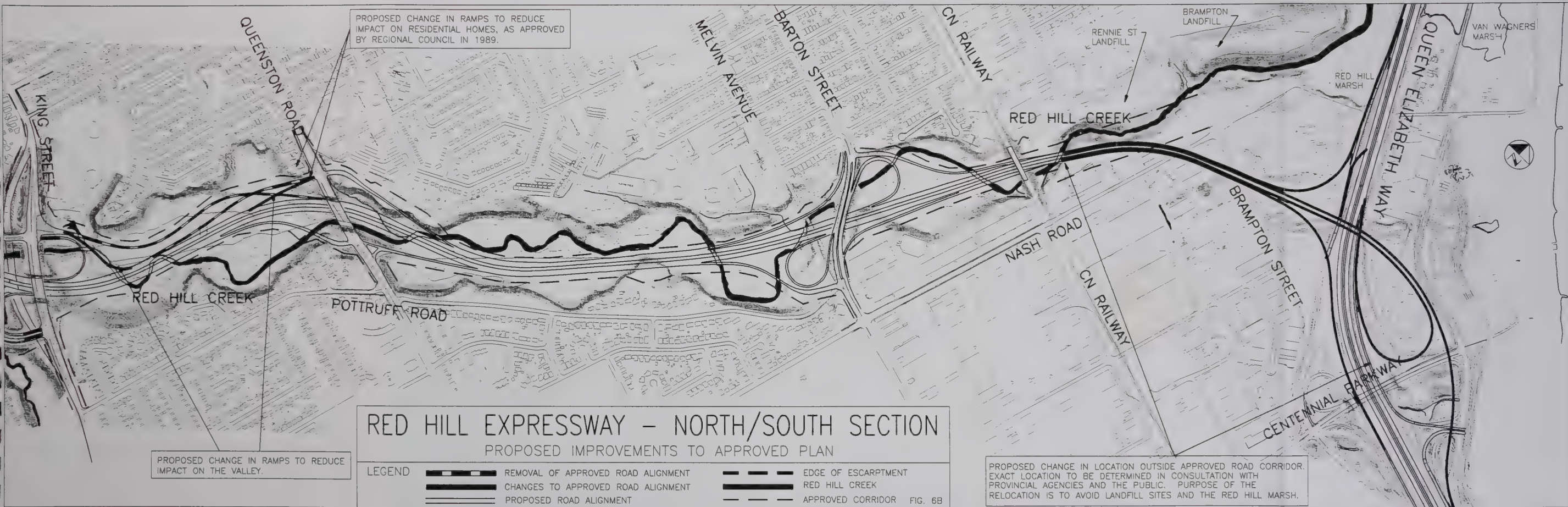
(Decision of the Joint Board, 1985, at p. 187)

At the end of the proceedings the Board accepted the Region's environmental assessment and approved the undertaking, subject to the conditions discussed in the previous section. Accordingly, so long as the undertaking is designed, implemented and constructed in accordance with the approval, and the conditions attached to that approval, no further EAA approvals are required by the Region. However, it is a question of fact as to whether the changes the Region is proposing today conforms with the 1985 approval.

Proposed Changes

There are essentially three categories of changes to the approved Expressway that the Region is considering: type and location of a Queen Elizabeth Way (QEW) interchange, Niagara Escarpment crossing location and structure type, and community access opportunities (vehicular, cyclist, and pedestrian). Figure 6 illustrates





Red Hill Creek Expressway North-South Section: Proposed Assessment Process

the location of the proposed changes to the approved North-South Expressway.

From an EAA approval perspective, each of the aforementioned categories of change should be further divided into 'major' and 'minor'. The importance of this distinction is discussed later in this report (see Draft Exemption Order Submission).

Changes to the QEW interchange and Niagara Escarpment crossing are considered 'major' for the following reasons:

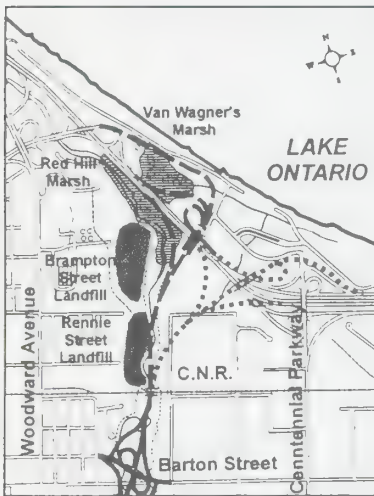
- at a conceptual level of detail, environmental impacts appear to be less intrusive than the approved design, however, a more site specific assessment should be undertaken to quantify and compare impacts, modify design details, highlight tradeoffs and identify overall improvements to the environment; and
- impacts of the proposed changes have not been reviewed by all relevant stakeholders and approved by either Local or Regional Council. (Assessment procedures outlined in Section 2 and 3 of this document will be followed.)

Proposed changes to community access are considered 'minor' for one of the following reasons:

- involve the removal of an Expressway component that is no longer required for transportation purposes; or
- resolve problems that were brought to the Region's attention after the original Expressway design was approved. In either case, proposed changes have been approved by Local and/or Regional Council. Requirements to mitigate or compensate related impacts will be determined through the assessment process described in Sections 2 and 3 of this report.

The following is a description of: the proposed change(s), related objectives, supporting rationale, and (in the case of the QEW and Niagara Escarpment) alignments/locations the Region proposes to compare before reaching a conclusion on the final expressway design.

Red Hill Creek Expressway North-South Section: Proposed Assessment Process



Queen Elizabeth Way (QEW) Interchange

Proposal: To determine within the area generally bounded by the QEW, Canadian National Railways - Grimsby Subdivision, Highway 20, and Woodward Avenue the appropriate location for a "trumpet" type interchange connection to the QEW.

Objectives: To reduce impacts on wetlands and landfills, and maintain safe traffic operations on the QEW

Rationale: The Joint Hearing Board decision confirmed the need for an Expressway connection to the QEW and included this in the definition of the undertaking. The exact location of the interchange was not specified although a possible alignment was shown in the Environmental Assessment document. Early alignment locations crossed Van Wagner's Marsh, Red Hill Marsh, and two landfill sites located within the approved corridor. The Ministry of Transportation (MTO) was given responsibility by the Joint Hearing Board for determining the final interchange location and design. MTO's responsibility has now been delegated to the Regional Municipality of Hamilton-Wentworth.

Since the earlier work completed by MTO on this location, the Red Hill Marsh and Van Wagner's Marsh have been designated Provincially Significant (Class I).

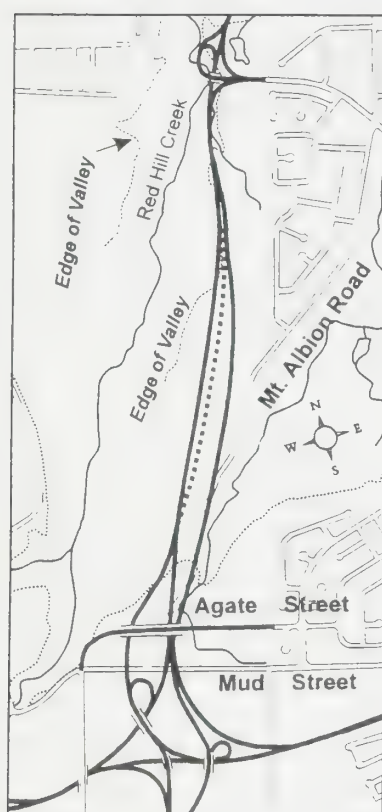
An Expressway/QEW interchange located closer to Highway 20, will allow the Region to reduce environmental impacts and maintain acceptable traffic operations. This new proposal would be located outside of the approved roadway corridor. On June 20, 1995, Regional Council authorized a development freeze on lands in this area.

Comparison: i) Trumpet 'B' type interchange aligned through the Rennie Street Landfill, Van Wagner's

Red Hill Creek Expressway North-South Section: Proposed Assessment Process

Marsh, and Red Hill Marsh as examined by MTO in 1990; or

- ii) Trumpet 'A' type interchange aligned through industrial lands located in the southeast corner of Nash Road and Brampton Street (outside of the approved roadway corridor).



Niagara Escarpment Crossing

Proposal: To assess, within the limits of the approved corridor, the environmental benefits of crossing the Niagara Escarpment with a single alignment on the west side of the hydro-towers rather than twin alignments on the east or west side of the towers, as originally approved. Change the original concept of building the Expressway entirely on earth fill with a combination earth fill/viaduct (bridge) approach.

Objectives:

- To reduce cuts on the Escarpment brow and earth fill requirements;
- To reduce the Expressway grade;
- To reduce impacts and costs associated with utilities;
- To reduce the aesthetic impact of the Escarpment crossing; and
- To accommodate pedestrian/cyclist and wildlife movements.

Rationale: The approved Expressway alignment crosses the Niagara Escarpment in the following manner:

- ascending lanes and descending lanes cross the Escarpment at 6% and 7% grades, respectively, on fill material;
- northbound traffic travels on a two-lane alignment located just east of the Ontario Hydro corridor (adjacent to Mount Albion Road); and
- southbound traffic travels on a three-lane (including truck climbing lane) alignment just west of the Ontario Hydro corridor.

Red Hill Creek Expressway North-South Section: Proposed Assessment Process

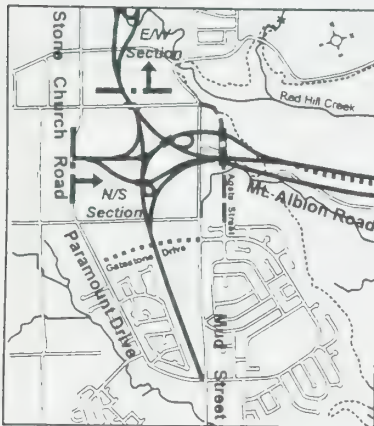
In the Environmental Assessment report (EA), the Region indicated that this portion of the Expressway would create major impacts to the aesthetic character of the Escarpment. In an effort to reduce the predicted impact, the Region, in 1994, assessed the feasibility of crossing the Niagara Escarpment on a viaduct (bridge) at an approximate 4% grade with all travel lanes aligned one side of the Ontario Hydro corridor. The preliminary findings indicated that the roadway could be accommodated on the west side of the hydro corridor on a viaduct.

During this time, discussions with the Niagara Escarpment representatives focused on which side of the hydro corridor would have the least overall impact. Again, preliminary investigations appeared to favour the west side as opposed to the east. The problems identified with an easterly alignment were as follows:

- higher costs to access hydro corridor (i.e., would have to construct service road for Ontario Hydro and Trans Northern Pipeline);
- significant impact to local recreational land use (i.e., golf course would have to be reconfigured);
- must relocate Trans Northern Pipeline;
- must relocate trunk sanitary sewer; and
- does not provide pedestrian/cyclist access from the lower area to the upper.

- Comparison:
- i) the approved plan which splits the travel lanes on both sides of the Hydro towers and requires earth fill to bridge the road as it crosses the Escarpment; or
 - ii) build all lanes on the west side of the Hydro towers on a viaduct within the approved corridor.

Community Access



Eliminate Agate Street Crossing and Add Gatestone Drive

Proposal: To eliminate the Agate Street extension and Expressway bridge crossing from the approved project and provide neighbourhood access via Gatestone Drive. Specifically, extend Gatestone Drive to complete the Paramount Drive loop across the Mud Street extension with an at-grade intersection.

Objectives: To provide a more cost effective solution to the neighbourhood access alternative originally proposed.

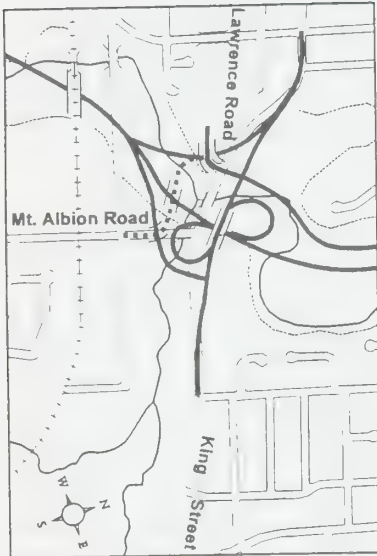
Rationale: The extension of Agate Street over the Expressway was intended to replace the east/west access on Mud Street that was cut off by the Expressway. In 1988, the Region reviewed this approved design with the City of Stoney Creek Planning Department and together concluded that the extension could be eliminated because east/west access would still be available via Paramount Drive/Stone Church Road. This proposal was subsequently approved by both City and Regional Councils in 1989.

Gatestone Drive was initially requested by the Ontario Realty Corporation to complete the Paramount Drive loop as part of the local street system and improve traffic operations in the Heritage Green neighbourhood.

Representatives of the Bruce Trail Association (BTA) objected to the elimination of the Agate Street Extension because the original design was in the general location of its existing trail system which helped to maintain continuity. Regional Council approved a new pedestrian bridge at the top of the escarpment in addition to the approved pedestrian underpass located near Glen Castle Drive (approximately 1 km north).

Red Hill Creek Expressway North-South Section: Proposed Assessment Process

The Region's proposal to build an alternative Escarpment crossing structure (i.e., viaduct/bridge) would allow the Bruce Trail Association to maintain pedestrian access under the Expressway along the base of the Escarpment.



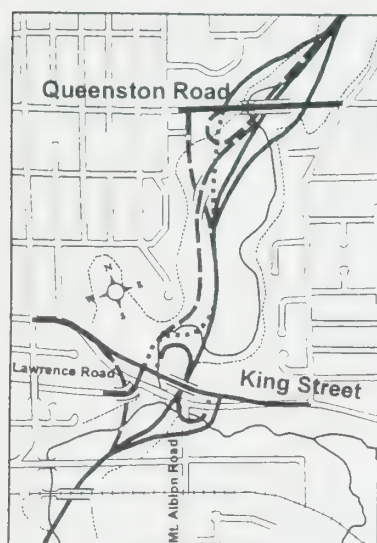
Mount Albion Road/Lawrence Road Connection

- Proposal:** To provide a neighbourhood access from Mount Albion Road to Lawrence Road as a result of the closure of Mount Albion Road at the King Street interchange.
- Objectives:** Provide direct community access to King Street; and improve emergency access.
- Rationale:** During preliminary design investigations in 1989, the Red Hill neighbourhood residents raised concerns about local neighbourhood and emergency access as well as an expected increase in traffic along the local street system. Residents were particularly concerned with the potential increase in traffic along Albright Road which is planned to support a number of new schools. Residents also expressed concern about the lack of emergency access to the residential area north of the T.H. & B. line in the event of a train derailment or blockage of Mount Albion Road. In 1989, Regional Council approved the Mount Albion Road/Lawrence Road connection at an estimated cost of \$3.5 million.

Queenston Road Interchange

- Proposal:** To reconfigure the ramp design in the south west quadrant of the Queenston Road interchange and eliminate the basket weave lanes between Queenston Road and Lawrence Road.
- Objective:** To reduce the number of residential units displaced by the approved design; and

Red Hill Creek Expressway North-South Section: Proposed Assessment Process



Rationale:

To remove the basket weave lanes that are no longer needed.

The approved design includes a North-East loop exit ramp to Queenston Road. Replacing the loop ramp with a standard diamond type interchange ramp would eliminate the need to acquire three houses. Regional Council approved the reconfigured ramp design in 1989.

Recent investigations determined that the basket weave lanes between Queenston Road and Lawrence Road are no longer needed from an operational perspective.

Pedestrian/Cyclist Accesses

Proposal:

To re-examine the opportunities for pedestrian access and, where appropriate, cyclist access to the Bruce Trail, Red Hill Valley Trails and City recreational sites.

Objectives:

To ensure appropriate pedestrian/cyclist access to the Valley and its trail systems; and to ensure Bruce Trail access is maintained.

Rationale:

Access to trails currently being developed by the Red Hill Valley Restoration Project should be enhanced. New opportunities may also be created as a result of proposed changes to the Escarpment crossing.

Council (FSC Report 90-046, approved May 1, 1990) directed that a sidewalk be provided on the south side of the Greenhill Interchange for a pedestrian link to the Valley.

The need, number and location of all pedestrian and cyclist accesses should be assessed in light of other proposed changes.

Locations:

- i) EA approved location for pedestrian crossings south of Melvin Avenue;

**Red Hill Creek Expressway North-South Section:
Proposed Assessment Process**

- ii) locations proposed in early stages of design, specifically, Greenhill interchange and at the top of the Niagara Escarpment/Bruce Trail and crossing the QEW; and
- iii) other feasible locations that may be brought forward as part of the Red Hill Valley Restoration Project - Recreational Master Plan and through stakeholder consultation.

Any other refinements to the Expressway's horizontal or vertical alignment that arise during the assessment process which serve to mitigate environmental impacts, will be considered approved under the existing Environmental Assessment.

***Need to Amend an
Approved EA***

Proposed changes to an undertaking that do not conform to any condition of approval, are subject to the EAA. Specifically, subsection 17(b) of the EAA states:

17. Where a proponent of an undertaking proposes to make a change in the undertaking,

(b) after the Minister has given approval to proceed with the undertaking, that does not conform to any term or condition imposed upon the approval to proceed with the undertaking,

this Act applies to the proposal to make the change in the undertaking as though the proposed change were itself an undertaking to which this Act applies.

The Region proposes that both major and minor changes to the approved Expressway should be subject to the EAA, and therefore, require further approval.

***Ways to Amend an
Approved EA***

Further EAA approval can be obtained through three approaches. They include:

**Red Hill Creek Expressway North-South Section:
Proposed Assessment Process**

- 1) Individual EA - this approach would be subject to the full requirements of the EAA and a government review would be required. The Minister could then accept the environmental assessment and approve the undertaking, with or without conditions, or she could refer one or both of these decisions to the board for a hearing.
- 2) Municipal or Provincial Class EA - this process tends to be more streamlined in that government reviews are not required unless a bump-up request is received and granted by the Minister. If that happens, the Class EA follows an acceptance and approval process that is the same as an Individual EA.
- 3) Exemption Order - pursuant to section 29 of the EAA, the Minister may do the following:
 29. *Where the Minister is of the opinion that it is in the public interest, having regard to the purpose of this Act and weighing the same against the injury, damage or interference that might be caused to any person or property by the application of this Act to any undertaking, the Minister, with the approval of the Lieutenant Governor in Council or of such Ministers of the Crown as the Lieutenant Governor in Council may designate, may by order,*
 - a) *exempt the undertaking or the proponent of the undertaking from the application of this Act or the regulations or any matter or matters provided for in this Act or the regulations subject to such terms and conditions as the Minister may impose;*
 - b) *suspend or revoke an exemption referred to in clause (a);*
 - c) *alter or revoke any term or condition of an exemption referred to in clause (a)*

In addition to the statutory requirements, MOEE has formulated Interim Criteria which describe the matters that should be addressed by any proponent who seeks an Exemption Order under the EAA. The Interim Criteria

Red Hill Creek Expressway North-South Section: Proposed Assessment Process

recommend the following matters be addressed as part of any exemption request:

- an assessment of the overall benefits of the exemption;
- reasons for/basis or nature of any public agency concerns;
- an assessment of effects;
- adequacy of other legislation or approvals to deal with issues of concern; and
- proof that an emergency situation exists.

The Selected Approach

The Region has chosen to subject all proposed changes to the approved undertaking to the EAA. The Region has decided to use the Exemption Order approach to obtain EAA approval.

Why This Approach?

Prior to the development of this document, a number of people requested that the Region undertake an Individual Environmental Assessment (Individual EA) to: justify the need for the Expressway North-South section; fully analyze and evaluate alternatives; and review cost implications.

As indicated, an Individual EA for the Red Hill Creek Expressway has already been submitted, accepted, and approved by a Joint Hearing Board. **The Region, therefore, has authority under the EA Act to construct the Expressway as originally planned, subject to receiving approvals and regulatory permits required by other legislation (see previous section).**

According to the original EA submission the rationale for the Expressway from Highway 403 to the QEW was:

- to stimulate the development of designated residential and industrial lands south of the Escarpment;
- to adequately accommodate future travel demand across the Escarpment in the east end of Hamilton and in Stoney Creek;
- to reduce truck and automobile traffic on local streets; and
- to improve safety on Highway 20 by shifting truck traffic from Highway 20.

Red Hill Creek Expressway North-South Section: Proposed Assessment Process

This need for a roadway was later affirmed by the Province through the "Crombie Report" in 1994. The Region also re-examined the need for additional roadway capacity across the Escarpment in view of the lower population and employment projections that have been experienced since the original EA was approved. It was concluded that a basic 4-lane facility is still needed. This facility should, however, be constructed as a freeway rather than an arterial roadway as recommended by Crombie because it would:

- stimulate the development of designated residential and industrial lands south of the Escarpment;
- be compatible with the other components of the freeway network: Highway 403, the QEW and the East-West section. Deletion or downgrading the facility would result in a reduced level of region-wide transportation service, particularly truck traffic;
- provide adequate traffic capacity under the Vision 2020 demand scenario and divert traffic from local streets; and
- be safer and operationally superior.

In light of these previous statements, the Region believes that Expressway design changes currently proposed can be properly considered through an Exemption Order. Approval does not waive the Region's requirement to comply with other Provincial/Federal environmental legislation.

A new Individual EA will not change the basic need for the Expressway or result in the selection of an entirely new corridor. Revisiting these issues would constitute an inefficient use of scarce resources.

Without exception, all proposed changes to the approved Expressway design concept are expected to further reduce the environmental impacts predicted in 1985. The full extent to which environmental impacts can be reduced will be determined after the Exemption Order is granted.

Exemption Order Approval Process

An Exemption Order must be obtained prior to the commencement of construction. However, there is no specific time frame for processing submitted exemption requests. Furthermore, as of November 15,

1994, exemption requests under the EA Act must be placed on the Environmental Bill of Rights (EBR) registry for a period of 30 days. During this time period, members of the public may bring forward an Exemption Order review application to the EBR Commissioner. Upon receipt of an application for review, the Commissioner has 10 days to refer the application to the appropriate ministry (in this case MOEE). The Minister of Environment and Energy must make a decision on the need to review the Exemption Order request further or if the Minister concurs with the Exemption Order, will request Cabinet to approve it.

*Draft Exemption
Order Submission*

The Exemption Order submission will consist of an assessment process that compares and determines the overall benefits of the proposed 'major' changes to the approved Expressway in consultation with government agencies, interest groups and the public. Changes that are considered 'minor' in nature (i.e., have already been assessed and subsequently approved by Council), will be identified with supporting rationale. Mitigation requirements revealed through the assessment process will be developed in consultation with the aforementioned stakeholders.

*Questions &
Comments*

When completing the Comment Sheet contained in Appendix A, please indicate:

- i) Are there other changes to the approved Expressway design worth considering?
- ii) Do you have any comments concerning the Exemption Order approach the Region is taking to finalize the Expressway design?

Comment Sheet



*Red Hill Creek Expressway
North-South Section
Proposed Assessment Process*

Comment Sheet / Questionnaire

Comments are being collected to assist the Region of Hamilton-Wentworth in finalizing the Red Hill Creek Expressway North-South Section Assessment Process. They will be maintained on file for use during the study and may be included in study documentation. With the exception of personal information, all comments received will become part of the public record.

Please clearly print your responses to the following questions.

Please refer to the Proposed Assessment Process document when answering the following questions. Use as much space as you need to answer questions.

Section 1 - INTRODUCTION

i) Are there other issues/concerns you feel are missing from Table 1?

ii) What would you say are the three most important concerns/issues that must be addressed by the Expressway assessment process?

Section 2 - STAKEHOLDER CONSULTATION PROGRAM

i) Do you have any suggestions that will improve the stakeholder consultation program?

ii) Can you suggest other dispute resolution strategies we should consider?

Please turn over

Section 3 - APPROVALS/PERMITS AND IMPACT ASSESSMENT

- i) Are there other applicable legislation, policies, and guidelines that should be considered when carrying out the assessment process?

- ii) Do you have any comments concerning the watershed approach the Region is proposing in terms of data collection, impact prediction and the Expressway’s overall involvement?

- iii) What changes, if any, should be made to the consultant terms of reference (see Appendix D)?

- iv) What other types of mitigation/compensation measures should be considered?

- v) Do you support the use of a qualitative ‘trade-off’ approach when evaluating proposed changes to the approved Expressway?

- vi) What other considerations should be addressed when developing a construction monitoring plan?

**Section 4 - EXPRESSWAY DESIGN CHANGES AND ENVIRONMENTAL ASSESSMENT
ACT APPROVAL**

- i) Are there other changes to the approved Expressway design that should be considered?

- ii) Do you have any comments concerning the Exemption Order approach the Region is taking to finalize the Expressway design?

Section 5 - GENERAL COMMENTS

Please use this space to record any other concerns/comments you might have.

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There is no handwriting or other markings on the paper.

Please return your completed Comment Sheet before March 22, 1996 to:

John van der Mark, Director
Roads Department
Predesign and Special Projects Division
Regional Municipality of Hamilton-Wentworth
25 Main Street West, 10th Floor
Hamilton, Ontario L8P 1H1

Name and Address (Optional): _____

Conditions of Approval

Appendix B



The Joint Board

THE CONSOLIDATED HEARINGS ACT, 1981

IN THE MATTER OF an undertaking of the
Regional Municipality of Hamilton-Wentworth
to develop and construct the Mountain East-
West and North-South Transportation Corridor
to connect Highway 403 in Ancaster to the
Queen Elizabeth Way in the eastern portion
of the City of Hamilton; and ancillary
matters related thereto

Before M.I. Jeffery, Q.C. Chairman (Dissenting)
A.B. Ball, Member
M.D. Henderson, Member

October 24, 1985

5th Floor,
1 St. Clair Avenue West,
TORONTO, Ontario
M4V 1K7

Therefore it is the decision of this Board:-

- (1) That the Environmental Assessment as amended be accepted for this undertaking pursuant to Section 12 of The Environmental Assessment Act, (R.S.O. 1980, c. 140).

- (2) That approval be given to proceed with the undertaking herein, pursuant to Section 12 of The Environmental Assessment Act, (R.S.O. 1980, c. 140), and subject to the terms and conditions set out in Schedule "A" attached to this decision and forming part hereof.
- (3) That the application by John Ellis to amend the Official Plan for the Hamilton-Wentworth Planning Area as referred to this Board by the Honourable Minister of Municipal Affairs and Housing, pursuant to Section 17 of The Planning Act, (R.S.O. 1980, c. 379) (Minister's File No. 25-OP-0056), be dismissed.
- (4) That the Niagara Escarpment Commission be directed to issue a development permit pursuant to Sections 24, 25 and 26 of The Niagara Escarpment Planning and Development Act, (R.S.O. 1980, c. 316), and subject to the terms and conditions set out in Schedule "B" attached to this decision and forming part hereof.
- (5) That the Hamilton Region Conservation Authority be directed to issue a permit pursuant to Section 28(3) of The Conservation Authorities Act, (R.S.O. 1980, c. 85), and subject to the terms and conditions set out in Schedule "C" attached to this decision and forming part hereof.
- (6) That approval be given to proceed with Stage 1 and Stage 2 of the undertaking herein, pursuant to Section 64 of The Ontario Municipal Board Act, (R.S.O. 1980, c. 347).

- (7) That costs in the total amount of \$150,000.00 be paid by the Regional Municipality of Hamilton-Wentworth jointly to The Save Valley Committee, Inc. and the Limeridge Road Property Owners Interest Group, Inc.

DATED at TORONTO this 24th day of OCTOBER, 1985.

A.B. BALL
MEMBER OF JOINT BOARD

M.D. HENDERSON
MEMBER OF JOINT BOARD

SCHEDULE "A"

Conditions - The Environmental Assessment Act

- 1) That upon completion of construction of the undertaking herein the Regional Municipality of Hamilton-Wentworth shall establish a system of monitoring with respect to noise, air quality and erosion so as to ensure that the designed and constructed mitigation features of the undertaking are in fact effective so as to mitigate the above matters to standards within the criteria established by the Province of Ontario. This monitoring program is to be conducted at least annually.
- 2) That a proper pedestrian right-of-way be provided across the expressway at Melvin Avenue.
- 3) The archaeological site known as the Spera site (AnGw-31) must be subject to mechanized topsoil stripping prior to Stage 2 construction. Such activity shall be supervised by a licensed archaeologist.
- 4) The 19th century homestead site located southwest of Nardi Court (not identified in DeLCan's 1980 report) shall be subject to the same mitigation measure as in 1, i.e. mechanized topsoil stripping supervised by a licensed archaeologist.
- 5) The Freeway corridor in the Town of Ancaster shall be subject to archaeological survey and investigation by the proponent, with

mitigation measures being adopted, if necessary, by the proponent following consultation with the Regional Archaeologist of the Ministry of Citizenship and Culture.

- 6) The late 19th century farmhouse located on Garth Street and identified by the proponent in Heritage Resources Documentation, July 1982, shall be subject to further detailed recording prior to demolition, mainly in the form of black and white photographic recording of elevations.
- 7) With respect to the remnants of the lime kiln located adjacent to Upper James Street, the following shall be carried out prior to disturbance of the site:
 - (i) the preparation of measured drawings and a site plan of the existing lime kiln remnants;
 - (ii) the carrying out of historical and archaeological survey work to determine the extent of the lime kiln complex; to identify foundation or other physical remnants of the complex where they exist; and to determine if further archaeological mitigation measures are necessary (Staff of M.C.C. shall be consulted to ensure that work carried out is satisfactory);
 - (iii) the lime kiln remnants shall be relocated to a suitable site and preserved and maintained as a monument. Work shall be carried out as provided for in condition 6.

- 8) The hamlet of Mount Albion shall be subject to complete and comprehensive recording prior to disturbance and shall comprise the following:
- (i) a comprehensive written history of the settlement from its earliest origins to the present day;
 - (ii) a compilation of graphic material, e.g. contemporary (black and white) and historical photographs; contemporary and historical maps of the area; which will comprise a comprehensive visual record of the settlement; its buildings and inhabitants;
 - (iii) any relevant oral history from past or present residents of Mount Albion;
 - (iv) any archaeological mitigation measure that may be deemed warranted by the results of historical investigations.
- N.B. All work shall be carried out by suitably qualified persons. Staff of M.C.C. shall be consulted to ensure that work carried out is satisfactory. Material collected will be deposited with appropriate bodies or agencies.
- 9) In Mount Albion those buildings identified as being of architectural and/or historic interest in this environmental assessment and as a result of condition 6 shall be recorded prior to their removal. Such recording shall be agreed upon by the proponent and M.C.C. and will be informed by this Ministry's guidelines.
- 10) Those buildings identified in condition 7 shall be relocated subject to the feasibility of such actions, i.e. availability of suitable

sites; distance; cost; and structural condition, after consultation and agreement with M.C.C.

- 11) Those road bridges to be removed or made redundant should be described on recording forms provided by M.C.C. Mitigation measures, e.g. adaptive re-use; incorporation of plaques into new structures, etc. shall be agreed upon by the proponent and M.C.C.
- 12) The cemetery at Mount Albion is to be adversely affected through acute disruption of its surroundings. Detailed landscaping plans shall be prepared by the proponent indicating appropriate mitigation measures, e.g. vegetative plantings; berm construction. Such measures shall be agreed upon by M.C.C.

SCHEDULE "B"

Conditions - The Niagara Escarpment Planning and Development Act

- 1) That those public lands in the Red Hill Creek Valley which are unaffected by the undertaking herein be reserved for possible future public recreation use.
- 2) That results from storm water run-off and erosion studies to be completed as part of the design process for the undertaking herein be incorporated into the design of any future master plan of recreation intended to implement condition 1.
- 3) That a detailed grading plan be submitted for Niagara Escarpment Commission approval to minimize the effects of construction on Escarpment and Valley slopes.
- 4) That a detailed tree preservation and planting plan be submitted for Niagara Escarpment Commission approval to protect existing vegetation and to provide for a visual screen of the route.
- 5) That a limit of work fence be erected 10 feet from the top of any slope and adjacent to any forested areas to prevent any unnecessary damage outside the construction area.

SCHEDULE "C"

Conditions - The Conservation Authorities Act

That the works be constructed in accordance with the recommendations of the hydrologist Larry Thompson, as stated in evidence by him on January 16, 1985, with respect to: the size and elevation of creek channels and culverts, the type of materials to be used for lining the channels, the size and elevation of openings through the two railroad embankments, and the size and elevation of storm water storage areas.

- (1) The following shall be substituted for Schedule "C" to the decision of the Joint Board.

← Order in Council

"Conditions - the Conservation Authorities Act;

That the works be constructed in accordance with the recommendations of the hydrologist Larry Thompson, as stated in evidence by him on January 16, 1985 (or as may be modified through the detailed engineering design process) with respect to: the size and elevation of creek channels and culverts, the type of materials to be used for lining the channels, the size and elevation of openings through the two railroad embankments, and the size and elevation of storm water storage areas.

That the detailed proposals for the placing of fill, erosion control, sediment control during construction and the phasing of the works (as related to minimizing possible impacts during the actual construction) be submitted to the Hamilton Region Conservation Authority for approval. However nothing in this condition will interfere with the issuance of the permit pursuant to s.2H(3) of the Conservation Authorities Act or the overall proceeding of the project in accordance with the decision of the Joint Board."


- (2) There shall be added a Schedule "D" to form part of the decision as follows:

"Conditions - the Lakes and Rivers Improvement Act;

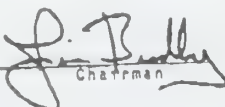
That detailed construction and design plans be submitted to the Ministry of Natural Resources for review and approval pursuant to the Lakes and Rivers Improvement Act."

The decision of the Joint Board is otherwise confirmed.

Recommended


Attorney General and
Chairman, Cabinet
Committee on Legislation

Concurred


Chairman

Approved and Ordered

March 12, 1987

Date


Administrator of the Government

Background Studies

REFERENCES

RED HILL CREEK WATERSHED STUDIES

Archaeology

Delcan Ltd. - Archaeological Survey and Heritage Resource Assessment - East-West/North-South Transportation Corridor, June 1980.

Air Quality

Ontario Research Foundation- Mountain East-West and North-South Transportation Corridor - Air Quality Aspects, January 1985.

Rowan Williams Davies & Irwin - Pollution Dispersion Assessment for the Proposed Mountain Transportation Corridor, October 1989.

Economic Development

Currie, Coopers & Lybrand - Regional Economic Development and the Proposed East-West and North-South Transportation Corridor, September 1984.

Engineering

Regional Municipality of Hamilton-Wentworth, Mountain East-West and North-South Transportation Corridor, Preliminary Design Report, January 1990.

Engineering Design

Fenco Lavalin - Mountain East-West and North-South Transportation Corridor, and North-South Parkway Preliminary Design - Study Design (Upper Ottawa to Brampton Street), n.d.

Fenco Lavalin - Mountain East-West and North-South Transportation Corridor, and North-South Parkway Detail Design, Study Design from Station 25 + 250 to Station 27 + 550, September 1989.

Engineering - design - geotechnical

The Trow Group Ltd. - Mountain East-West and North-South Corridor Study - Phase III, April 1979.

The Trow Group Ltd. (for Delcan) - Mountain East-West and North-South Corridor Study - Phase IV, May 1980.

The Trow Group Ltd. (for Delcan) - Geotechnical Investigation - Proposed Red Hill Creek Freeway Escarpment Crossing - Mount Albion Road - Hamilton, Ontario, November 1980.

Golder Associates Ltd. - Geotechnical Infill Programme - North-South Parkway - Hamilton-Wentworth, Ontario, March 1989.

Golder Associated Ltd. - Geotechnical Investigaton - Rennie Street Landfill - North-South Parkway - Hamilton, Ontario, March 1989.

William L. Sears and Associates Ltd., The Regional Municipality of Hamilton-Wentworth Mountain East-West and North South Transportation Corridor Project Office (Relocation of Sanitary Sewer Project #30004-1), July 1989.

Trow Ontario Ltd. - Volume II - Geotechnical Investigation - Proposed North-South Parkway - Pritchard Road To Kings Forest Park, December 1989.

Golder Associates Ltd. - Geotechnical Investigation - King Street Bridge - Pedestrian Bridge - Culverts 9 and 23 - December 1989.

Golder Associates - Geotechnical Investigation - Queenston Road Bridge and Retaining Walls North-South Parkway, January 1990.

Golder Associates Ltd. - Geotechnical Investigation - North-South Parkway/T.h. & B. Grade Separation, January 1990.

Trow Ontario Ltd. - Volume I - Geotechnical Investigation - Proposed North-South Parkway - Pritchard Road to Kings Forest Park, May 1990.

Golder Associates Ltd. - Geotechnical Investigation - North-South Parkway/CN Rail Grade Separation - Hamilton, Ontario, May 1990.

Golder Associates Ltd. - Geotechnical Investigation - Proposed culverts and bridges - King Street to Queenston Road, Red Hill Creek Expressway, December 1990.

Peto MacCallum Ltd. - Leachate & Methane Impact Assessment - Dartnall Road Section of the Freeway Project, January 1994.

Engineering - design - hydraulic

Dillon - Report on Redhill Creek Flood Plain Mapping for the Hamilton Region Conservation Authority, March 1975.

Morrison Beatty Ltd. Hydrogeologic Assessment of Brampton Street Landfill site, December 1980.

Hec2 Data - 2 Year and 5 Year Storm Results, 1983.

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Consultants Terms of Reference

PHYSICAL & BIOLOGICAL STUDIES - TERMS OF REFERENCE

General:

The purpose of the physical and biological studies is to characterize the biological resources and physical resources and systems linkages that could be affected by the Red Hill Creek Expressway North South section. This objective will be realized through, compilation and analysis of existing data from various sources, the completion of a detailed field assessment and inventory of the existing biological resources, where required, and a study of the physical processes which occur throughout the watershed and which influence the environment affected by the Expressway.

The environmental inventory and assessment will be carried out at two levels of detail: watershed wide and site specific.

Watershed:

- A comprehensive description of the biological resources and physical processes, and ecosystem linkages (ie Functions and Linkages) existing within the **watershed** which may impacted by the Expressway or related works.
- The watershed level collection and analysis of data will assist the Region in assessing the impacts of the proposed changes as well as provide the basis for investigating types of mitigation and areas where monitoring may be required.

Site Specific:

- A detailed **site specific** inventory of the biological and physical features as well as physical processes (i.e. functions and linkages) that may be impacted by **changes in and adjacent to the Expressway corridor** will be carried out. The study area will vary depending on the resources being examined. The Inventory will assess the significance of features, linkages and processes as well as identify other factors which may be limiting these resources within the valley.
- The site specific data collection and analysis will be used to assess the impacts of the proposed changes as well as to provide a detailed level of information on which to base mitigation.

The Region will utilize existing information and data collected through other projects. In particular, the Red Hill Creek Restoration Project Technical Reports will be referenced. The data will be used to assess the potential impacts of the Expressway and to develop mitigation and monitoring plans.

The following terms of reference outline:

- the objectives of the study,
- the products of each study,
- the study area (watershed and site specific)
- the tasks to be carried out to provide an adequate inventory (watershed and site specific), develop mitigation, assess impacts, and develop a monitoring program.

The field work and sampling for the biological and physical studies will be coordinated to ensure that the data is collected in a consistent and comparative way. Field surveys and sampling protocols developed through studies by others will be reviewed to ensure that they meet accepted standards. Acceptable surveys and protocols will provide the basis for the Region's work.

The terms of reference will be refined as the study progresses to reflect the conditions encountered during the inventory stage. Major changes will be reviewed with interested agencies and public.

D.1 HYDROGEOLOGY

The Expressway has the potential to impact on areas of groundwater recharge and discharge. This study will be carried out to understand where this potential exists and to identify the magnitude or significance of the impact, and to make recommendations on mitigation and monitoring.

Key Objectives:

Characterize the hydrogeological functions of the Red Hill Creek watershed to ensure that:

- the hydrogeological functions related to habitat are identified and maintained, where possible and,
- the roadway design and operation reflects the relevant hydrogeologic features.

Products:

- Baseline inventory mapping and report outlining hydrogeologic conditions.
- List of hydrogeologic constraints and general recommendations to guide the Expressway design. The report will take into account the potential cumulative impacts due to future land uses as designated in the Regional Official Plan.

Tasks:

1.0 Obtain and Review

- Background geotechnical reports and existing geological and hydrogeological reports and maps from the Region of Hamilton-Wentworth and other sources.
- Ministry of Environment and Energy well records within the regional ground water system of the Red Hill Creek watershed. Incorporate this data with monitoring well data from other reports to identify general zones within the Red Hill Creek watershed which provide a significant hydrogeologic function.
- Review fisheries information from Region, Ministry of Natural Resources, Hamilton Region Conservation Authority & the Red Hill Valley Restoration Project to identify any discharge zones within the valley.

2.0 Field Inspections

- Undertake site inspections of the Red Hill Creek to verify/determine locations of critical hydrogeological functions (ie discharge/recharge).
- Carry out streamflow measurements and collect water quality samples during low flow. Water samples are to be analyzed for inorganic and isotope parameters.
- Identify any deficiencies in existing information base and prepare recommendations as to how deficiency can be corrected.
- Installation of piezometers and other monitoring equipment as determined through previous work, to be utilized to determine groundwater recharge/discharge conditions and baseflow in specified areas of interest.

Prime target areas for field inspections could include wetlands and major springs.

Utilize the foregoing information to determine:

- Quaternary Geology
 - Groundwater Flow patterns, recharge/discharge areas within the watershed.
 - Identify seepage zones along the Expressway corridor to be incorporated into Expressway design (ie. avoid disturbance to natural functions)
 - Identify major groundwater flow pathways (i.e. fractured limestone and sand lenses)
 - Identify the hydrogeological function of significant wetlands
- 3.0 Prepare mapping of groundwater flow patterns, watershed wide discharge/recharge zones, and locations of significant hydrogeologic functions within the valley.
- 4.0 Based on the assessment of the locations identified in Task 3.0, prepare a suitable monitoring program to monitor long term changes to discharge and groundwater levels.
- 5.0 Prepare documentation of the findings with conclusions and recommendations to guide the Expressway design process.
- 6.0 Conversion of mapping to format compatible with Regional mapping systems and data bases.

Timing:

Phase 1

Identification of perennial groundwater springs and determination of groundwater derived baseflow contribution to the Red Hill Creek watershed would be best undertaken during an extended cold period. Provided there is be no winter thaw, field conditions during the early part of February would ensure that the flow in Red Hill Creek is totally groundwater derived and would allow for minor springs to be more easily detected.

Phase 2

The second phase of field work will be carried out through the late spring and summer months. The extent of field work during this phase would be dependent on the review and assessment of existing information and the results of the Phase 1 field program. The Phase 2 field program may include instrumenting and monitoring critical wetland areas to determine whether they function as discharge or recharge areas. In addition a second round of low flow measurements may be necessary to assess seasonal variations in baseflow.

Site specific field work assessing the potential impacts resulting from the proximity of the expressway corridor to the various landfills may be warranted depending on the current extent of groundwater characterization at the landfill sites.

D.2 STREAM MORPHOLOGY

The Red Hill Creek has experienced impacts which have changed its width, depth and the way it meanders due to a number of changes in the watershed over time. The watershed is more developed with more hard surfaces, and this has caused the creek to shift and move to respond to changes in surface water flows. In order to understand the impact of the Expressway on the creek it is necessary to understand how the creek has changed over time and how it will respond to additional changes.

Key Objectives:

- Characterize the channel form of the Red Hill Creek and its tributaries and identify key elements affecting long term stability.
- Develop mitigative strategies to address:
 - impacts due to existing and proposed anthropogenic forces which are causing disruption to the natural channel dynamics, and
 - potential impacts of the Expressway.
- Develop criteria to guide the design of a stable creek taking into consideration bankfull capacity, meander geometry and substrate material which is intended to facilitate existing and future sediment supply and flow regimes.

Products:

- Existing and Future(stable) stream classification based on Rosgen criteria for all relevant reaches of the watercourse (Red Hill Creek and its tributaries).
- Performance and geometric criteria to be utilized in stream alteration and design associated with the proposed Expressway construction.

Tasks:

1.0 Obtain and Review:

- Earliest aerial photographs or plans showing watercourse location.
- Most recent aerial photographs.
- Topographic mapping
- Stream flow monitoring records

2.0 Based on the existing data (Task 1.0) determine:

- locations where diversions or structures (ie. grading, filling, bridges, and concrete channelization) impact stream morphology,
- major stream types and geographic divisions in stream type (ie. above below and at the Escarpment) based on slope, sinuosity, belt width, entrenchment geologic unit and flow input locations.
- areas of greatest change (ie channel migration, structural confinements, storm sewer outfalls and channelization).
- bankfull flow based on frequency analysis (to be used as a check only as bankfull flow determination will be based on field survey information).
- channel morphology on tributary watercourses not associated with Expressway to assess sediment supply and transport characteristics and associated implications for the main channel of the Red Hill Creek.

- 3.0 Classify the major divisions of stream type, and determine the appropriate number and locations of reaches to be field surveyed. Based on review of topographic information it appears that 4-6 stream types are present along the Expressway corridor.
- 4.0 Undertake site inspection of the full length of the Red Hill Creek in the valley as well as tributaries associated with the Expressway corridor to:
- photograph various locations (This will be undertaken in conjunction with a review of previous hydraulic modelling and previous photographic inventory dating from work on the Expressway design in 1988-1989.)
 - Video the watercourse

This will provide:

- the basis for understanding the nature and rate of channel form changes at various locations over the past 7-8 years
 - the basis for projections of channel form in the future,
 - an indication where erosion is currently causing unstable slopes that affect structures or private property and could impact the Expressway.
 - an assessment of the potential future impacts on the channel by the Expressway and the effectiveness of various natural channel design and stormwater management techniques..
 - an assessment of the need for additional field surveys to update the hydraulic modelling.
- 5.0 Undertake field surveys and monitoring to determine:
- Bankfull flow and bankfull channel cross-sectional characteristics, meander geometry, and riffle/pool sequence characteristics.
 - Location of holocene terraces.
 - Representative channel bank composition to determine critical shear stress indices.
 - Pavement and sub pavement and point bar sampling. This sampling will provide an indication of the bedload particle distribution of the stream and an indication of the critical velocities within the stream.
- 6.0 Undertake installation and monitoring of bed and bank pins (control points) at selected locations to obtain data relating to inter-pool gradients and channel migration at critical locations. This data will be used to determine a baseline assessment of channel stability/instability and will allow the continued monitoring of channel forming processes following Expressway construction. Photographic documentation of monitored locations is also recommended.
- 7.0 Based on the field surveyed information determine:
- Existing stream classification(Rosgen) and assessment of channel form stability
 - Proposed stream classification type where the existing channel is unstable.

- Sediment transport characteristics (ie. grain size distribution not quantity)
- Critical velocities to target for proper sediment transport and stable channel design.
- Areas along the creek where vegetation is stabilizing the creek banks

Based on the field data gathered, the characteristics of a stable stream morphology and meander geometry can be determined for use during the preliminary and final design stages of the Expressway.

- 8.0 Additional analysis of sediment supply quantity and grain size distribution will be gathered (in- situ) to assist in determining stream form. Sampling is typically developed over a number of seasons and years to be meaningful. The in-situ sediment sampling must be undertaken at or near bankfull discharge (above 75% bankfull discharge) and will include sampling on both the rising and falling limbs of the storm hydrograph. Therefore, a sediment monitoring program should be started immediately. The benefits include:
- Providing a baseline for in-stream sediment transport to determine existing sediment supply rates and stream bedload transport capacity. The potential uses for this information include:
 - Use as a design parameter for the final design stage to ensure that the proposed stream rehabilitation incorporates the existing sediment supply rate.
 - Use as a basis for comparison to the amount of sediment loading during and following construction activity. This may assist in determining whether sediment control measures used during construction are effective, and whether the sediment transport following construction varies from the existing conditions.
 - Use as a basis for comparison of existing and post construction stream forming processes which in turn will be used to evaluate effectiveness of mitigation measures.
- 9.0 Develop a mapping base illustrating various stream morphologic characteristics.

Timing:

Instream bedload sampling should be undertaken at or near bankfull flow conditions (75 % of bankfull or greater) and should commence as soon as possible.

D.3 HYDROLOGY

Key Objective:

Develop a representative simulation model of the Red Hill Creek Watershed for existing and future land use conditions, and Expressway development which may be used to predict:

- peak flows and volumes for various rainfall events to generate criteria for roadway design to satisfy the requirements of regulatory agencies for flood and erosion protection.
- baseflow impacts resulting from construction of the Expressway and other factors such as existing and proposed land use based on Official Plan designations.

- erosion and stream morphological impacts associated with Expressway construction and other external land use changes.
- effectiveness of various mitigation strategies.
- general stormwater management strategies for areas of future development based on Official Plan land use designations.

Note: Flow analysis and assessment will consider the effects of future development based on Official Plan designations. This study is not, however, intended to prescribe land use constraints. Modelling of generalized stormwater management strategies for development external to the Expressway will be examined in the analysis. However, the design of the Expressway will be based on conservatively estimating the impacts of future development on peak flows and runoff volumes and utilizing these values as design parameters for the Expressway elements unless the assumption of future uncontrolled runoff results in peak flow rates or volumes which pose a significant constraint to Expressway design. In such a case, the applicable stormwater management strategies will be advanced together with the Expressway design as necessary to ensure compatibility.

Products:

- A set of flow values for existing conditions, future land use, and Expressway development which may be used to:
 - evaluate various stormwater management alternatives associated with the expressway
 - evaluate generalized stormwater management strategies for areas subject to future development based on Official Plan land use designations.
 - determine appropriate sizing and elevation of various elements of the roadway.
 - assist in the determination of appropriate sizing and operational characteristics of stormwater quality, quantity and erosion control facilities for the proposed roadway.

Tasks:

- 1.0 Obtain and review updated information from the Region and City of Hamilton regarding storm sewer configuration and contributing areas.
- 2.0 Review and update existing hydrologic model (HSP-F):
 - incorporate changes to current and future developed land uses (without storm water management).
 - update reach routing sub-model as required.
 - where possible based on hydrogeologic information, vary interflow parameters to reflect baseflow conditions.
 - calibrate model to baseflow and flood flow conditions.
- 3.0 Undertake continuous simulation of existing and various future land use conditions for the available rainfall record (1962- present).
- 4.0 Apply the U.S. Geological Survey's interactive hydrologic model utility (ANNIE) in conjunction with the Watershed Data Management (WDM) format, for this project.

The use of the Annie/WDM format greatly assists in the storage, statistical analysis and graphical display of large volumes of hydrologic and meteorologic data.

An additional benefit is the establishment of a baseline for assessment of the impact of on-going development within the watershed.

- 5.0 Undertake appropriate statistical analysis of flow data to determine peak flow frequency recurrence intervals for various locations along the watercourse. This information would be used to size various elements of the roadway and drainage system to meet regulatory criteria.
- 6.0 Analyze continuous simulation results, for various locations, to assess long term exposure of the watercourse channel to excess shear stresses in order to determine overall erosion susceptibility and effectiveness of various channel modifications.
- 7.0 Identify impacts and potential mitigation to meet Federal, Provincial and Municipal Regulatory standards and performance objectives with respect to:
 - Water Quality
 - Water Quantity
 - Erosion Potential
 - Baseflow
- 8.0 Identify watershed/subwatershed stormwater management strategies to:
 - achieve dynamic equilibrium in channel forming processes at locations where channel form is presently unstable
 - ensure that channel forming processes are maintained in dynamic equilibrium at locations where the watercourse is presently stable
 - preserve required baseflow
 - mitigate water quantity issues (ie. flood and erosion potential)
- 9.0 Develop appropriate mapping base to delineate various subcatchments, watercourse reaches and nodal points in a format compatible with the Region's mapping system.

Timing:

Not dependant on seasonal conditions with possible exception of integration with base flow monitoring for hydrogeologic assessment.

D.4 WATER QUALITY

Key Objectives:

- Characterize the pollutants common to both road and other urban sources which could potentially impact water quality. Possible pollutants could include:
 - nutrients
 - suspended sediments
 - CSO effluent
 - Potential groundwater borne contaminants from various past land uses, including landfill effluent
 - Airborne contaminant deposition

- Develop a working knowledge of the pollutants found in the Red Hill Creek and associated tributaries from existing data including:
 - identification of the pollutants,
 - estimates of pollutant loading due to existing and proposed land use including the Expressway. Pollutant loadings will be related to Provincial standards.
 - prediction of potential impacts of the Expressway and other land uses.
- Develop a list of primary pollutant sources and identify opportunities to address existing pollution sources in conjunction with the roadway facilities.
- In conjunction with hydrology, hydraulics, and hydrogeology, provide the basis for the development of stormwater management alternatives for the Expressway.

Products:

A comprehensive management strategy to address water quality issues in the context of Expressway development. Opportunities to address sources of pollutants outside the Expressway in conjunction with Expressway works will be identified.

Tasks:

- 1.0 Liaise with Municipalities, Agencies and Public/Public Interest Groups to identify water quality issues and data sources (ie. Green Hill and Upper Ottawa Outfall, CSO outlets) and to identify past and present water quality improvement programs such as:

Discuss present and future CSO abatement initiatives, identify proposed CSO locations, so that roadway drainage/treatment facilities can be coordinated.

HRCA & RHCVRP

Discuss and review results of monitoring to date, including community based long term monitoring, and identify sources where possible.

Hamilton Harbour Remedial Action Plan.

Discuss current and future RAP initiatives and coordinate any proposals with roadway design etc. Obtain any available data regarding pollutant loading from the Red Hill Creek to the Harbour.

Ministry of Environment and Energy.

Identify relevant past lands use impacts and whether any potentially existing effluent/seepage occurrences can be incorporated within the roadway drainage/treatment facilities, and obtain data, where available.

Discuss overall key pollutants and relative importance.

City of Hamilton.

Identify various outfalls and contributing areas (ie. Green Hill and Upper Ottawa) and explore possible incorporation of outfall and roadway drainage/treatment facilities.

- 2.0 Undertake water quality sampling if necessary to:

- Establish existing pollutant loadings for key locations where combination/co-ordination with Expressway facilities and other public works projects such as CSOs are considered. Information gathered will provide an indication of the baseline conditions and would be used to assist in design of water quality facilities.
- fill deficiencies or gaps in the information obtained in Task 1.0.

- 3.0 Review methods of treatment to reduce pollutant loadings associated with the Expressway development to acceptable levels.
- 4.0 Develop a list of opportunities to co-ordinate or combine water treatment facilities of the Expressway and other public works projects.
- 5.0 Undertake benthic surveys at various locations along the Red Hill Creek taking into consideration survey locations used in previous studies.

Timing:

Seasonal Characterization sampling recommended as well as typical "wet/dry" characterization. Location of sampling points should be determined in conjunction with hydrogeologic field assessment results.

D.5 HYDRAULICS

Key Objectives:

Develop a representative hydraulic model of the Red Hill Creek Valley for existing and proposed conditions which may be used to predict:

- flood elevations and velocities for various frequency events to provide criteria for roadway design to meet requirements of regulatory agencies for protection from flooding and erosion.
- flood stage/storage relationships for use in the hydrologic model
- flood stage/storage relationships for use in assessment of erosion potential during the existing and future conditions as well as determining the erosion resistance of proposed realigned sections of the watercourse which would be identified during the design phase.

Products:

- Updated Hydraulic modelling for the Red Hill Creek Valley. The Hydraulic model will include HEC-2 datasets and could include datasets compatible with the Hydrologic Engineering Centre, River Analysis System (HEC-RAS). The HEC-RAS program offers a graphical user interface, separate hydraulic analysis components and management capabilities, graphics and reporting facilities.
- Flood Plain Mapping for the Red Hill Creek Valley and Expressway corridor at a minimum. The flood plain mapping/HEC-2 model could be linked via the Flood Plain Management System (FPMS) interactive program developed by CartoLogix.

Tasks:

- 1.0 Review previous hydraulic information and models.
- 2.0 Identify locations where changes have occurred.
- 3.0 Field survey of key locations where changes in infrastructure (roads, bridges, etc. influencing hydraulics) and other topographic features have occurred in the last 7-8 years (ie King Street, Queenston Rd, TH&B crossing)
- 4.0 Update and re-run model(s) based on updated flow and topographic changes where necessary.

- 5.0 Utilize flow values based on future land use to determine:
- controlling (ie. Regional, 1:100 etc) flood levels with and without roadway (ie. develop flood plain mapping)
- Note: Assessment may include evaluation of cost/benefits associated with a lower protection level, hence the full range of design events (100 yr., 50 yr., 25 yr., 10 yr., 5 yr., and 2 yr.) will be required.
- hydraulic impact of Expressway on erosive channel velocities, particularly bankfull flow for major channel forming flow, and, maximum velocity for locations such as bridges, roadway sections, and pipeline and utility crossings.
- 6.0 Apply HEC-RAS program (primarily improves display capabilities in present model - future version to include sediment transport analysis capabilities) if deemed appropriate.
- 7.0 Integrate Flood plain mapping with Regional mapping and Flood Plain Management System if deemed appropriate.

Timing:

Not seasonally dependant.

D.6 GEOTECHNICAL

Key Objectives:

The geotechnical study will:

- define the composition and engineering properties of the soil along the Expressway corridor. This will involve delineation of the limits of competent native soils and/or bedrock, stream bottom sediments, talus material and fill.
- evaluate the stability of the existing slopes adjacent to the roadway and/or identify slopes that could be adversely impacted by construction of the proposed roadway
- evaluate the potential for streamflow erosion of soil along the creek valley and the impact on the future roadway

Products:

The results of the study will be presented in a report which will summarize the subsurface conditions along the study corridor and provide mapping, geotechnical comments and recommendations concerning:

- the stability of existing slopes along the study corridor, the impact of construction on the stability of the slopes, the need for and recommendations to mitigate adverse impacts
- the impact of creek erosion on the stability of the creek banks, the need for and recommendations to minimize erosion if needed
- design of the pavement structure along the roadway including subgrade preparation, drainage requirements and the thickness of the various components of the pavement

Tasks:

The objectives of the geotechnical component of the study will be accomplished by:

- 1.0 conducting a detailed visual examination, including geologic mapping, of the valley walls and base along the study corridor
- 2.0 examining topographic information to identify slopes that could be impacted by construction and conducting visual examinations for evidence of previous slope movements
- 3.0 reviewing the extensive geotechnical information currently available along the study corridor in files and other reports available from the Regional Municipality of Hamilton-Wentworth
- 4.0 drilling a series of selectively located testholes along the study corridor to confirm the composition of the soils. The location of the testholes will be sensitive to significant natural features identified through previous studies.
- 5.0 conducting a laboratory testing program to measure pertinent engineering properties of the soils

Timing:

Field inspections should be undertaken in early spring after spring thaw but prior to vegetation cover becoming established. Drilling during winter months (ie frozen conditions) would typically minimize environmental impacts, however this would not preclude the need for drilling during other periods.

D.7 TERRESTRIAL

Watershed

This study includes identification and analysis of terrestrial linkages and natural habitats which intersect the watershed with particular reference to the Expressway corridor and the Red Hill Creek Valley (i.e. Niagara Escarpment, tributaries, wetlands, woodlots, & Lake Ontario shoreline)

Key Objectives:

- Develop a database on terrestrial linkages and habitats in the Red Hill Creek watershed.
- Develop an understanding of significant terrestrial linkage opportunities in the watershed, and their potential or actual use by wildlife species.

Products:

- Mapping of terrestrial linkages to the valley in a digital mapping format compatible with the Region's mapping system.
- Provide locations of known Regionally, Provincially, or Nationally significant species/habitats within identified linkages based on existing data.

Tasks:

- 1.0 Review background documentation including work completed by Hamilton-Wentworth Natural Areas Inventory, Red Hill Creek Valley Restoration Project (RHCVRP) and Regional Greenlands System.
- 2.0 Contact RHCVRP, MNR, Environmentally Sensitive Areas Impact Assessment Group (ESAIAG), the Regional Planning Department and Hamilton Region Conservation Authority to obtain current documentation of habitat & linkage resources.
- 3.0 Produce integrated mapping of linkages in a database form compatible with Regional mapping.
- 4.0 Produce recommendations and guidelines to maximize linkage opportunities to the Red Hill Creek valley.

Site Specific

This study will include a detailed assessment of terrestrial resources (i.e. vegetative communities) along and adjacent to the proposed roadway corridor as well as a relative ranking of importance of the various vegetation and community types to the ecological functions of the watershed. The ranking system and community mapping should be compatible with the Region's mapping system.

Key Objectives:

- Develop a comprehensive database of known terrestrial resources within the Red Hill Creek valley and in and adjacent to the Expressway corridor.
- Develop an understanding of key terrestrial habitats within the valley.
- Develop an understanding of linkages within the valley and the adjoining watershed, and their potential or actual use by wildlife species.
- Develop a comprehensive overview of terrestrial opportunities and constraints, and strategies to guide roadway design.

Products:

- Mapping of all upland, riparian and wetland communities within the valley in a format compatible with the Region's mapping system.
- Apply significance and sensitivity rankings to each of the identified communities based on anticipated effects of habitat disruption (including noise) within the communities or their vicinity.
- Provide accurate locations of all known Regionally, Provincially, or Nationally significant species and habitats according to MNR requirements.
- Identify and rank areas with existing disturbance, degradation or fragmentation which may offer ancillary benefits for restoration to alleviate or mitigate road-related impacts.

Tasks:

- 1.0 Review background documentation including work completed by Red Hill Creek Valley Restoration Project (RHCVRP).
- 2.0 Contact RHCVRP, MNR, ESAIG, Regional Planning Department and HRCA to obtain current documentation of valley resources, and input on further studies needed.
- 3.0 Where information gaps are identified, conduct detailed field assessment of terrestrial resources within and adjacent to the proposed highway corridor (including all proposed construction access routes).
- 4.0 Produce integrated mapping for entire valley corridor & vicinity potentially impacted by the Expressway. Vegetation community composition will be presented in a database form compatible with the Region's data base management system.
- 5.0 Produce comprehensive recommendations and guidelines to guide the Expressway design process, including prioritization of environmental features which may be affected by roadway construction, identification of habitat and corridor restoration opportunities (eg. wetland creation, reforestation), and recommended phasing which can reduce construction impacts.

Timing:

Background documentation should be gathered and reviewed prior to prime field season (i.e. prior to May). Detailed field assessments should be completed generally between May and August. Additional fieldwork may be required in selected areas into early autumn.

D.8 FISHERIES

Key Objectives:

- Prepare a comprehensive inventory of fisheries resources within the Red Hill Creek watershed.
- Develop a thorough understanding of the fisheries habitats within the Red Hill Creek watershed, including critical habitats and limiting features, such as barriers to migration.
- Develop an understanding of the linkages between fish habitats in the Red Hill Creek watershed and the fish habitats and fish communities of Hamilton Harbour and Lake Ontario.
- Develop a comprehensive set of constraints and opportunities, and strategies to guide roadway design which address regulatory requirements and policy objectives of Federal and Provincial agencies and stakeholders.

Products:

- Mapping illustrating all relevant fisheries information and limiting factors within various reaches of the Red Hill Creek in a format compatible with the Region's mapping system.
- An assessment of the significance, sensitivity, and mitigation/compensation/enhancement opportunities for each of the reaches of Red Hill Creek and tributaries that may be directly or indirectly affected by the project.

Tasks:

- 1.0 Review background documents.
- 2.0 Contact Ministry of Natural Resources, Environmentally Sensitive Areas Impact Assessment Group (public advisory committee to the Regional Planning & Development Department), Hamilton Harbour Remedial Action Plan and Red Hill Creek Valley Restoration Project to obtain relevant inventory information.
- 3.0 Identify any information gaps, and undertake the necessary activities to address these.
- 4.0 Undertake detailed assessment of fish habitats and communities within, and adjacent to, the proposed road corridor, in a manner consistent with the Ministry of Transportation/Ministry of Natural Resources Fisheries Protocol.
- 5.0 Produce a comprehensive set of recommendations and guidelines for the Expressway design process, which identify the features and functions affecting fisheries production, including limitations to movement. The existing constraints will also be categorized in terms of each component's relative importance in light of the overall fisheries resource
- 6.0 Produce integrated mapping for fisheries in a form compatible with the Region's mapping system.

Timing:

Documentation of migration and spawning must occur at the appropriate times. The same is true for evaluation of embryo and juvenile survival. The exact timing is species-specific, but spawning by most, species except the Pacific salmon, will occur in the spring (late March - May). Documentation of habitat conditions are most easily conducted from mid May to late November, depending upon the weather condition on any given year.

SOCIO/ECONOMIC & CULTURAL STUDIES

A number of socio-economic studies will be carried out to assess the impact of proposed changes and mitigation. The following terms of reference are provided:

- land use plans
- economic/industry/business
- noise & air quality
- site contamination
- visual assessment

D.9 LAND USE ASSESSMENT**Study Area Limits:**

Land use data will be collected and assessed at a watershed and site specific level of detail.

Key Objectives:

- Develop a baseline assessment of the existing (i.e., built, approved, and draft approved development) and future (i.e., identified in Regional/Local Official Plans, related zoning documents, and other planning activities, such as, the Red Hill Valley Restoration Project) land use conditions within the Red Hill Creek Watershed. Site specific investigations will focus on land uses in and adjacent to the approved Expressway and proposed design changes. This work will augment the economic assessment discussed later.

- Determine, in conjunction with other assessment activities, the extent to which existing and future land use is contributing to watershed problems.
- Predict the impacts the approved Expressway and proposed design changes will have on existing/future land use (i.e., recreational, residential, open space, etc.). Information generated during this step will be used to determine and assess mitigation measures.
- Provide input to the evaluation of proposed changes.

Products:

- Mapping that illustrates all relevant existing and future land use information in a format compatible with the Region's mapping system.
- A report documenting the land use inventory, related watershed problems, direct and indirect impacts to land uses caused by the Expressway and proposed design changes, proposed mitigation, and input to evaluation.

Tasks:

- 1.0 Review background documents (i.e., Local/Regional OPs, etc.) and consult with representatives of the Red Hill Creek Valley Restoration Project, local municipalities, interest groups, other government agencies, etc., to establish baseline land use conditions.
- 2.0 Identify any information gaps, and undertake the necessary activities to address these.
- 3.0 Predict the direct and indirect impacts the approved Expressway and proposed design changes to the Red Hill Creek Expressway North-South Section will have on existing and future land use.
- 4.0 Generate appropriate mitigation for the land uses displaced or disrupted by the approved Expressway and proposed design changes.
- 5.0 Contribute to the evaluation of proposed design changes.
- 6.0 Produce land use mapping in a form compatible with the Region's mapping system.

D.10 ECONOMIC ASSESSMENT

Objectives:

- Assess the economic impacts (direct and indirect) related to Expressway design changes in the vicinity of the QEW/Expressway interchange area.
- Assess the impacts of both construction and post construction phases of the project.

Products:

- Report outlining the impacts of the Expressway on businesses in and adjacent to the proposed Expressway corridor between the CN rail line and the QEW.

Tasks:

- 1) Provide an inventory of land uses in the area and attempt to understand the patterns of interaction of these uses with each other and others, as one aspect of determining the ways in which effects of the various design may be experienced. The inventory will include the identification of all businesses within the study area. The inventory will be based upon the Ministry of Finance assessment database, supplemented with information gathered from business directories and field verifications.
- 2) Each of the businesses within the study area will be interviewed to obtain information on the nature of the operation and its sensitivity to interchange-related impacts, number of employees, short and long-term plans, concerns regarding the project (construction phase and post completion), etc.
- 3) The information and data collected under tasks 1 and 2 will be used to assess the economic impact of the Expressway interchange alternatives. The analysis will treat properties under appropriate categories, including:
 - those that will be wholly acquired
 - those that could be partially acquired
 - those within the study area, but outside the acquisition area
- 4) Those properties that require full acquisition will be analyzed in a manner consistent with the Expropriations Act, which includes, but is not necessarily limited to, the consideration of the following:
 - the fair market value of the property and the associated enterprise (if applicable);
 - injurious affection;
 - legal and appraisal costs;
 - other related disturbance costs.

Expropriation will be considered only if the owner is unwilling to sell.
- 5) Properties that may result in partial takings will be evaluated in the same manner as those being fully acquired, with the potential impact being calculated as a percentage of the determined value.
- 6) Enterprises beyond the area of acquisition but within the study area, will be assessed relative to the potential impact of the various interchange alignments. As noted above, separate consideration will be given to the construction phase and the post-completion period of the project. Each enterprise will be reviewed individually according to a number of factors, such as:
 - the type and size of the enterprise;
 - the effect of the nuisance impacts, as measured by type, duration and severity of specific nuisances in accordance with nuisance level data provided by others;
 - the compatibility and sensitivity of the enterprises to such impacts, as well as, market image concerns; and
 - the potential for increased sales of goods and services, resulting from improved access and increased exposure to the enterprise from the interchange.

D.11 AIR QUALITY AND NOISE

Background

Air quality and noise have been identified as issues that must be addressed in this study. Earlier studies for noise (Valcoustics - 1980) and air quality (RWDI - 1989) were carried out for the Expressway; however, a number of changes to the roadway design, emissions estimates, traffic volumes, interchange design, etc. have been made since the original work was completed. As a result, the noise and air quality studies need to be updated. This proposal addresses the requirements for these two studies.

Air Quality Assessment

Objectives:

- review the air quality modelling for the Expressway and update it based on current information
- assess the air quality impacts of the proposed changes in relation to the approved route (in the case of the QEW connection the route proposed by MTO)

Product:

- Report that details the assumptions and methodologies used, identifies the impacts and presents the study findings.

Tasks:

- 1) The air quality assessment will consider a worst-case type of analysis. Worst-case conditions assume the simultaneous occurrence of adverse meteorological, traffic and high background ambient pollutant conditions. Although it is highly unlikely that this type of event will occur, this is an appropriate analysis methodology for the comparison of alternatives.
- 2) Quantify worst-case and average vehicular emission rates (g/vehicle/km) using Environment Canada's MOBILE5C vehicle emissions model (for carbon monoxide (CO) and oxides of nitrogen (NO_x)) as well as emission data documented in literature for suspended particulate matter (TSP) and the inhalable particulate fraction (PM-10). Nitrogen dioxide (NO₂) concentrations will be predicted from the NO_x emission data using the MOEE-approved "Ozone Limiting Method". Sulphur dioxide (SO₂) levels could be estimated, but as sulphur-based emissions are low from vehicular traffic and the Hamilton airshed is dominated by sulphur emissions from the steel industry, the contribution from the expressway is, by comparison, insignificant.
- 3) Quantify worst-case background pollutant concentrations for a nearby ambient air quality monitoring station by reviewing Ministry of Environment and Energy annual summary reports.
- 4) Using US-EPA numerical dispersion models such as CALINE-4 or CAL3QHC, assess the impact of combined worst-case vehicular emissions, adverse dispersion conditions and high background pollutant concentrations on air quality at the same number (137) of receptor locations that were used in the original study. CALINE-4 will be used for the stretches of expressway. Of the signalized intersections, CAL3QHC will be used for the intersection which has the largest number of traffic movements. For the QEW/Centennial Parkway interchange, the ramping will be simplified and no idling will be assumed. CALINE-4 can be used to predict concentrations where the expressway is routed outside the Red Hill Creek valley; however, where valley dispersion effects are encountered, algorithms will be used to simulate the canyon.

- 5) Compare the predicted concentrations for the pollutants of interest to the applicable provincial ambient air quality criteria.
- 6) Produce a written report that details the assumptions and methodology(s) used, identifies the impacts and presents the study findings. The results from the original assessment and this current effort will be compared. As part of the review process from the Joint Board (1985), an air quality monitoring program was established as a condition of approval. An air quality monitoring station was constructed in 1989 and is available for operation. The original air quality parameters of interest will be evaluated in light of the updated impact assessment. Recommendations will be provided with respect to the selection of parameters deemed to be relevant to any future ambient surveys.
- 7) With respect to the study of emissions from vehicular traffic, measurement surveys have been undertaken on Highway 404 by the Ministry of Transportation and the Ministry of Environment and Energy. Contact will be made with the study director for an update on the results of the evaluation of roadway emissions and atmospheric dispersion.

Noise Assessment

Objectives:

- review the noise assessments modelling for the Expressway and update it based on current information
- assess the noise impacts of the proposed changes in relation to the approved route (in the case of the QEW connection the route proposed by MTO)

Products:

- protocol for noise monitoring
- report outlining results of assessment, recommendations for mitigation

Tasks:

- 1) The proposed alignment will be toured on both the east and west sides. Residential and recreational areas will be visited. In order to confirm the results of noise monitoring from the previous study, short duration (20-minute) sound level measurements will be taken at all nine locations, as well as at any additional receptor locations considered necessary, particularly at the northern end of the Expressway between the CN Tracks and the QEW. During the visit, notes will also be made concerning the potential shielding effects by topography, etc.
- 2) The previously measured ambient sound levels will be increased to allow for local traffic changes from 1980 to 1996, and then compared to the present day short duration levels measurement results. Wherever significant differences are obtained, long duration (24-hour) noise monitoring will be repeated (up to two locations). Long duration noise monitoring will also be performed at all new receptor locations (i.e., QEW/Centennial Parkway interchange) to obtain a complete set of present day ambient sound level data. These sound level data will be extrapolated to year 2006 using the best traffic data available to give expected future no-build ambient sound levels.
- 3) Sound levels due to the Expressway will be modelled using either STAMINA 2.0, the traffic noise model developed by the US FHWA, or STAMSON 4.1, the traffic noise model developed by the MOEE. Traffic data used for the modelling will include the expected 2006 volumes for the expressway itself and local traffic volumes for the build case. Sound levels will be predicted for all receptor locations in the previous study, as well as any additional locations considered necessary.

- 4) Sound levels for the 2006 build case will be assessed for each receptor location according to the applicable requirements of the following documents:

- MOEE Noise Control Guidelines for Class Environmental Undertakings, February 1980; and
- MOEE/MTO Protocol for Dealing with Noise Concerns During the Preparation, Review and Evaluation of Provincial Highways Environmental Assessments, February 1986.

The sound level impact at each receptor locations will be determined quantitatively and also expressed qualitatively using an appropriate scale.

- 5) Wherever the Expressway is found to have significant impact, noise mitigation measures such as cuts, berms, walls and berm/wall combinations to reduce the noise impact will be investigated. The effectiveness of the noise mitigation measures will be calculated using noise barrier/shielding calculation capabilities of the traffic model used for the rest of the work. Only conceptual details will be provided.

- 6) A protocol will be developed for noise monitoring of the Expressway after construction to determine the impact of sound levels. The protocol will include the following:

- Listing of recommended critical receptor locations;
- Suggestions for appropriate timing of the monitoring;
- Meteorological conditions for successful sound level data collection;
- The minimum required sound level data set;
- A listing of all non-sound level data to be collected; and
- A decision with respect to mitigation.

Measured sound levels will be reviewed to determine whether further noise mitigation measures are required at locations not previously identified as being necessary.

- 7) A report will be prepared detailing all input data, sound level measurement and prediction results, sound level assessments, noise mitigation measures, recommendations for noise monitoring and all other recommendations and conclusions. As well, recommendations for the annual monitoring survey as mandated by the Joint Board will be provided.

- 8) In order to proceed with these studies, the following data will be reviewed:

- aerial photograph of the study area;
- drawings detailing the roadway corridor, interchanges, intersections and roadway design including vertical and horizontal sections;
- Projected peak one-hour and AADT traffic movements (distinguishing the movements in both directions) for each roadway lane of the expressway for the future (year 2006) scenario including estimates of medium and heavy truck percentages;

- Non-expressway traffic volumes for 1980 (i.e. data used for the previous noise study, 1996 and, predicted volumes for 2006 for Expressway no-build case;
- Worst-case and average traffic speeds, and speed limits;
- Project maps (with map scale) from which to create summary tables identifying the distance of sensitive receptor locations (e.g., parks, schools, daycares, seniors citizen's centres, etc.) and residences from the roadway centre;
- Intersection details such as light cycle times, turning movements by lane, and so on; and
- Topography information including shielding by terrain or existing barriers.

Additional information may be required as the study progresses.

D.12 CULTURAL STUDIES

The conditions of approval for the Red Hill Creek Expressway require that the Region carry out archaeological excavation and documentation at a number of sites assessed within the approved corridor. There is only one site (Spera) remaining within the approved corridor that requires excavation and documentation. All of the remaining archaeological conditions of approval have been cleared by the Ministry of Culture, Tourism and Recreation.

The conditions of approval for the Red Hill Creek Expressway also require that the Region carry out a number of studies and documentation on heritage features in and adjacent to the approved Expressway corridor. All of these conditions of approval have been cleared by the Ministry of Culture, Tourism and Recreation. Therefore, no additional heritage work is required within the approved corridor.

There are now areas proposed for changes outside the approved Expressway corridor and these areas have not previously been assessed for archaeology or heritage. The following describes the work that will be required in these areas.

Objectives:

- Completion of the conditions of approval for the Expressway for the Spera site.
- Compliance with the Ontario Heritage Act regarding the evaluation, assessment and mitigation for archaeological and heritage sites outside the approved corridor in the areas where changes are proposed.

Products:

- Report documenting the excavation of the Spera site to be submitted to the Ministry of Culture, Tourism and Recreation for clearance.
- Technical memorandum outlining the potential for archaeological and heritage resources in the areas proposed for changes outside the approved corridor. If there is no potential for archaeological and heritage features, no further documentation will be produced.
- Report documenting any findings in areas that may be found to have potential. This will be prepared if there are areas indicated as having potential for archaeological or heritage resources.

Tasks:

- 1) Excavate and document the Spera site just prior to construction since the excavation requires removal of vegetation.
- 2) Review the archaeological work carried out for the Expressway approval and by the Red Hill Valley Restoration Project as part of the assessment of areas outside the approved corridor.
- 3) Assess the archaeological and heritage potential of sites outside the approved corridor where changes are proposed. This assessment will follow the Ministry of Culture, Tourism and Recreation's guidelines for preparing environmental assessments.
- 4) If archaeological evidence or heritage features are identified, excavation and/or mitigation and documentation will be carried out to the Ministry of Culture, Tourism and Recreation standards.

D.13 SITE CONTAMINATION

The entire Expressway corridor North South section will be assessed to a Phase 1 level of detail to determine the potential for contaminated soil and/or groundwater. Phase 1 assessments are based on existing information and site visits, and contact with knowledgeable persons. If the potential for contamination is identified, further assessment and sampling (Phase 2) will be carried at those locations where potential is identified. If Phase 2 reveals levels of contaminants above accepted criteria, the Region will carry out a Phase 3 assessment which could include site remediation.

Purpose:

- To assess the potential for contamination soil and/or groundwater within the approved Expressway corridor and the proposed areas outside the corridor
- To develop a soil management plan for the project that ensures that the Roads Department meets its legislative obligations for managing contaminated soil and water in a way that is cost-effective yet protects human health and the environment.

Objectives:

- To prepare a comprehensive Phase 1 Environmental Site Assessment Report using information from previous studies as well as additional work, where necessary, in sufficient detail to identify the potential for contaminated sites
- To prepare and implement a Phase 2 site investigation plan, where necessary to confirm, quantify and determine the extent of suspected contamination according to the principles and criteria for sampling set out by the Ministry of Environment and Energy (MOEE) and other appropriate authorities
- To identify the properties where a Phase 3 (remediation) is necessary and to prepare a Phase 3 assessment of cost-effective remediation options to the level of detail necessary for road construction
- To obtain MOEE concurrence on the preferred remediation plan and any approvals necessary to implement the plan

Tasks:

PHASE 1 - ENVIRONMENTAL SITE ASSESSMENT

1. Historical Review of Land Use, Activities and Incidents

This review will utilize the following documentation where available:

- available site assessments and background documentation produced for associated road projects and any other studies available
- historical information (mapping, aerial photographs, title search)
- land title, previous ownership and environmental caveats and company records
- insurance maps/files
- municipal business directories
- regulatory agency records (it may be necessary to request access to MOEE files for the purpose of reviewing relevant files)
- municipal permit/approval records/agreements

2. Inspection of Property

Where it is considered necessary to supplement the above data, the consultant will conduct an on-site investigation of property with the following components:

- inspection of raw and finished materials handling
- chemical storage inspection
- waste management and storage practices
- presence of PCB's or asbestos-containing materials
- stained soils inspection
- inspection of building heating and cooling systems
- underground utilities inspection
- stressed vegetation inspection
- fuel storage tank inspection
- neighbouring property review

3. Interviews

The consultant will contact:

- the owners and/or tenants of property and carry out interviews to confirm/establish the types of practices that have been or are currently being used on site.
- City of Hamilton Property Department regarding the ownership of property, additional studies that may have been carried out on property, and to determine if owners are amenable to interviews, site inspections, etc.
- the Regional Facilities Management Department regarding status of the properties owned by the Region (if any)
- other departments, as necessary
- MOEE and other relevant ministries/agencies, as necessary

Products:

- a report outlining the areas of greatest risk of encountering contaminated soil within the road right-of-way and on surplus Regional property, and the type of contamination that can be expected
- a recommendation on the sampling and analysis and an indication of the parameters to be tested that may be required for a Phase 2 site investigation

PHASE 2 - SITE INVESTIGATION

If it is determined that additional investigation is required to confirm, quantify or determine the extent of a contamination, the consultant will prepare and carry out a Phase 2 Site Investigation Plan which may include:

- sub-surface exploration to establish soil stratigraphy and hydrogeology
- collection of surface and sub-surface sampling and other data
- analysis of samples
- investigation of above/underground storage tanks, AC sampling, PCB sampling, geomagnetic or geophysical sampling
- interpretation of field, laboratory or other data
- rationale for location and number of samples required and the type of analysis required

The installation of equipment and sampling procedures should follow recommended MOEE protocols.

Product:

- *Phase 2 Site Investigation Plan*
- *Results of the Investigation and interpretation of the data*
- *Recommendation on the need for a Phase 3 study*

PHASE 3 - ASSESSMENT OF REMEDIATION ALTERNATIVES

This phase will include the identification and assessment of options for remediation or management of confirmed environmental contamination. The options should take into consideration cost effectiveness, the land use proposed, clean-up criteria, and regulatory requirements. The plan and work programme will be submitted to the Minister of Environment and Energy for review, negotiation and approval.

Phase 3 will include, but not be limited to, the following activities:

- development of a preferred clean-up, remediation, or management plan and work programme
- detailed design and implementation
- monitoring and verification sampling
- MOEE review, negotiation and approval of remediation plan
- establishment of clean-up criteria
- public consultation/notification before clean-up begins
- regulatory approvals/permits
- submission of a Notice of Clean-up to MOEE

Product:

- *Remediation options and recommendation on appropriate remediation for specific properties to be implemented prior to or during road construction*
- *Regulatory approval for the remediation plan and implementation*

D.14 VISUAL ASSESSMENT

Study Area Defined

The limits of the potential project viewshed includes a minimum one kilometre radius surrounding the Niagara Escarpment section in the vicinity of the expressway crossing corridor. This zone also includes areas beyond one kilometre visible from within the project viewshed.

Key Objectives:

- Develop a baseline assessment of existing visual character within the proposed project viewshed including views of and from the proposed expressway crossing location.
- Develop a digital simulation model of the study area for existing and proposed conditions which may be used to:
 - i) Assess viewing conditions from which the project is seen; the distance and visible area over which it is seen and typical lighting and visibility conditions;
 - ii) Assess the degree of visual impacts;
 - iii) Integrate the impact assessment with the expressway and corridor design process.

Products:

- Analysis and summary of information documenting the existing visual character within the proposed project viewshed and a summary of visual preference data obtained from the public. A written report documenting the existing project viewshed in terms of overall visual character, visual quality and visual sensitivity. This information will be integrated with the Digital Terrain Model (DTM) discussed below.
- A DTM of the project viewshed as a simulation device to assess and communicate existing and proposed visual changes. Digital simulations may be used to:
 - i) evaluate the least visual intrusive roadway alternatives
 - ii) determine the causes and extent of particular visual problems
 - iii) design various mitigation treatments
 - iv) assess the residual visual impacts of the project, assimilated with selected mitigation treatments
- A written report will describe and document the Visual Assessment process and digital simulations of existing and proposed conditions within the project viewshed.

Tasks

- 1.0 Review of existing information pertaining to the proposed project, visual assessment research and visual simulation technologies.
- 1.1 Identification of people (e.g., landowners, recreationalists, existing road user groups) potentially affected by the visual impacts of the proposed project.
- 1.2 Conduct a visual resource inventory of the physical elements potentially affecting the visual quality of the study area.
- 1.3 Collection of visual preference information from members of the public most likely affected by the proposed project using surveys and/or public meetings to gather responses to existing conditions.
- 2.0 Base data collection including:
 - a) Contour elevation data
 - b) Location of structures and significant landscape features
 - c) Vegetation cover types (Relative height, form, color)
 - d) Creek location
 - e) Existing roads and housing.
 - f) Digital photography.
- 2.1 Digitize base information
- 2.2 Develop Digital Terrain Model (DTM) and photo-realistic simulations for existing conditions
- 2.3 Simulate proposed roadway alignments in the digital model.
- 2.4 Visual Impact Assessment of proposed alternatives.

Timing:

- 1.0 The visual resource inventory and collection of visual preference information should be conducted during the spring and summer period.
- 2.0 Tasks 2.0, 2.1 and 2.2 would be undertaken in concert with the Tasks under Objective A; this would require a period of approximately three months.

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